Engineering and Mining Journal

McGraw-Hill Co., Inc. Price, 20c. New York, October 26, 1918

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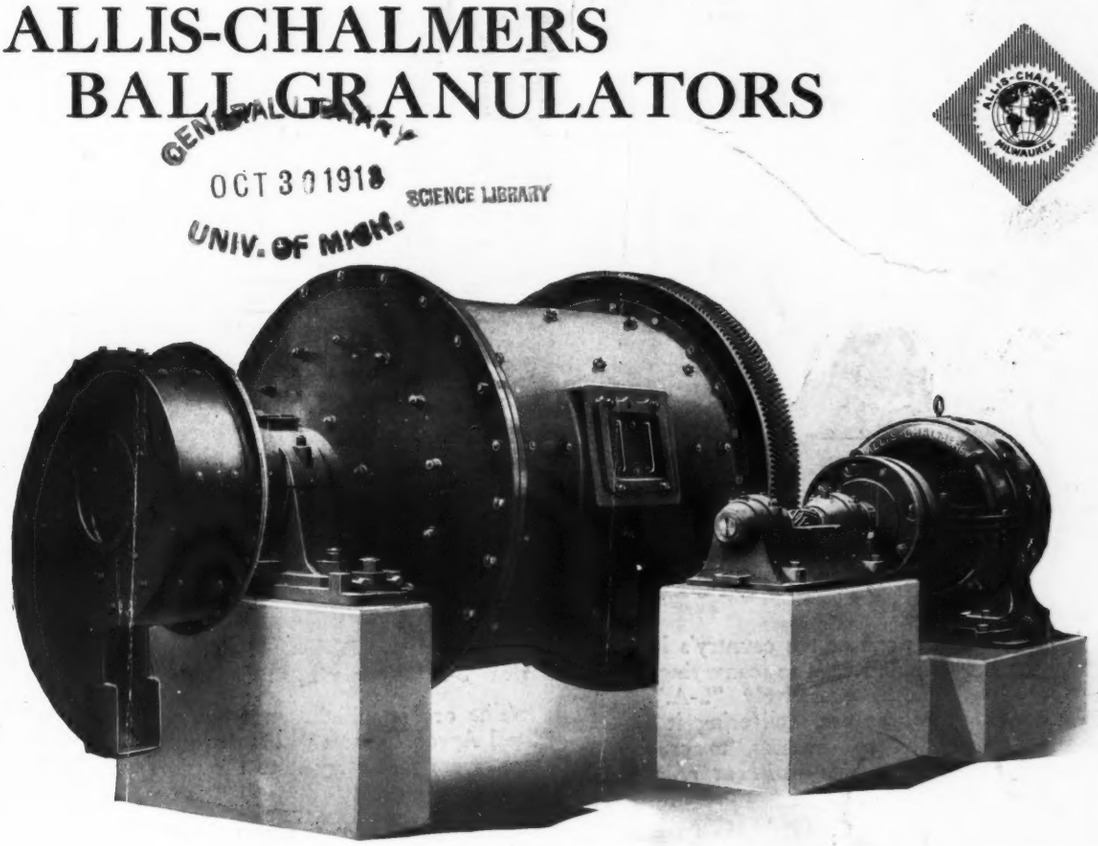

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Engineering and Mining Journal

WALTER RENTON INGALLS, *Editor*

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No back volumes for more than one year and no back copies for more than three months.

Change of Address—When change of address is ordered the new and the old address must be given. Notice must be received at New York at least ten days before the change takes place.

Published Weekly. Entered as second-class matter June 20, 1879, at the Post Office at New York, under the Act of March 3, 1879.

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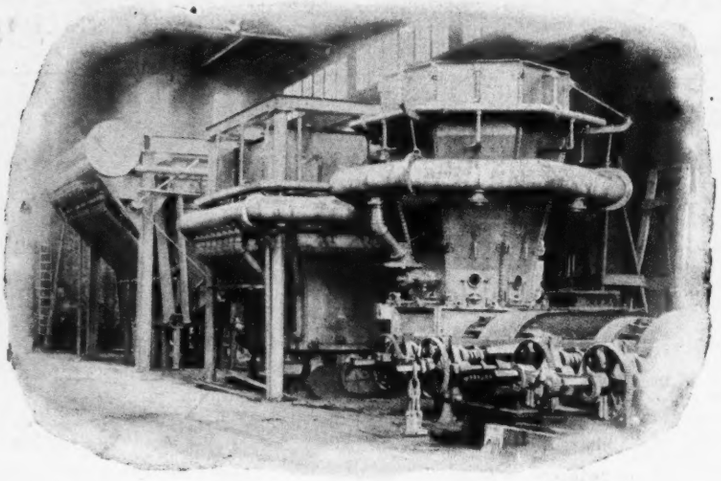

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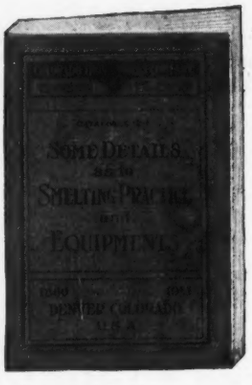

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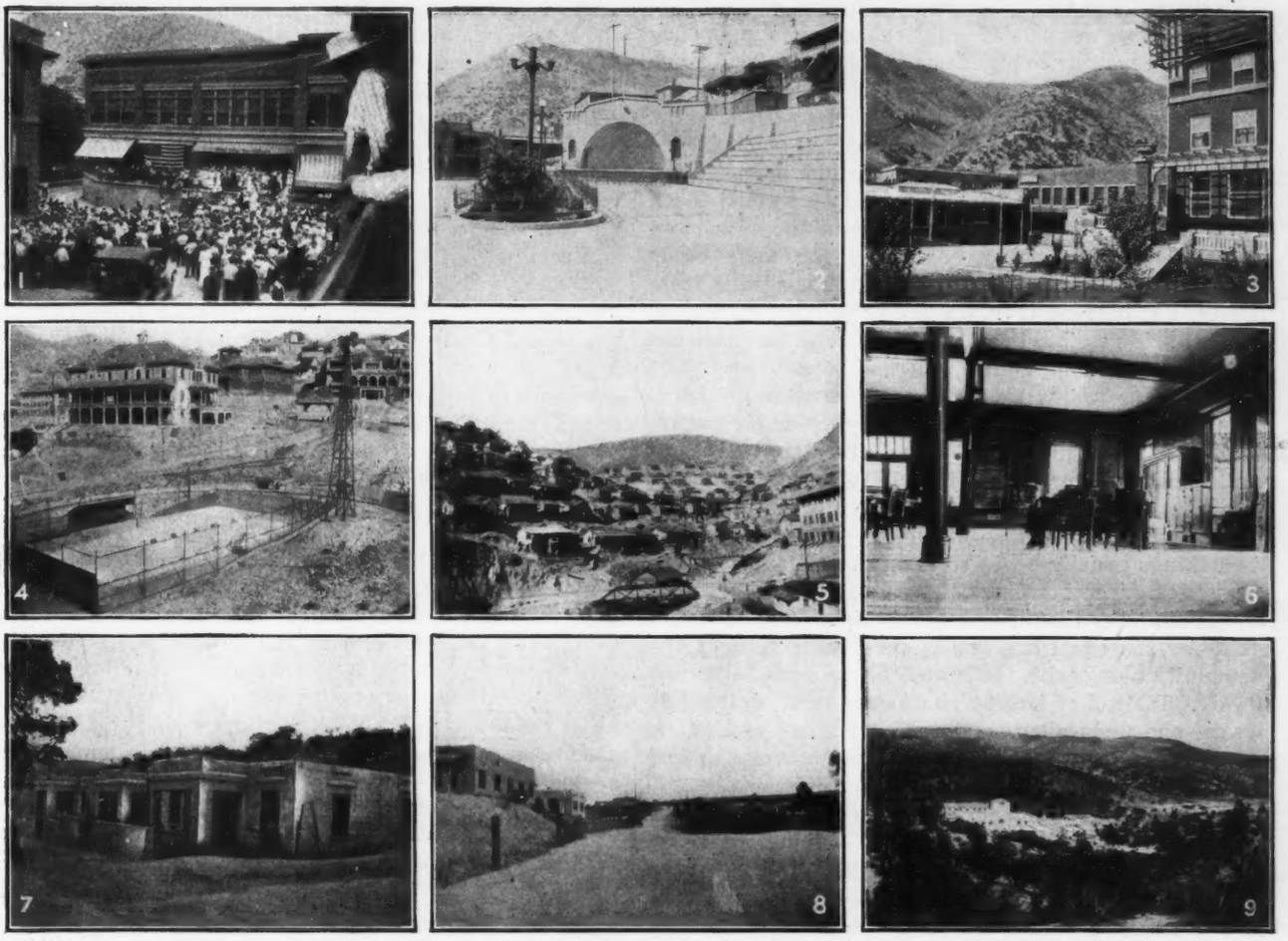

VIEWS FROM MINING TOWNS OF ARIZONA AND NEW MEXICO

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The Life of a Mining Community

By CHARLES F. WILLIS*

The development of the mining community should proceed simultaneously with that of the mine. Labor troubles spring from bad living and working conditions, and often give a property or a camp a bad name, which it is difficult to rehabilitate. Special reference is made by Mr. Willis to the community work long pursued at Bisbee and Morenci, in Arizona, and Tyrone, N. M.

VOLUMES have been written on the life of the mine, but little has ever been said about the life of the mining community. Of course, the life of the mine and that of the community are generally of equal duration, but their development varies greatly, and it is as interesting to analyze the progress of the latter as to study the development of the former.

The early stages—those of discovery and initial exploration—offer no community problems, because, as a rule, there is no community. As exploration and development proceed, however, with the necessary additional labor, these problems begin to arise. Little difficulty is usually encountered at first, owing to the fact that small community bodies act as a unit in regard to their social, recreational and civic activities. As a small

*Consulting supervisor, Phelps Dodge Corporation, Bisbee, Ariz.

unit, the men work together; they eat together and play together. It is only when the unit is too large for personal and intimate intercommunication, when the growth of the camp is such that several units or cliques are formed, that the problem begins to assume definite proportions.

Problem Increases With Growth of Company

About the time that a company boarding house, bunkhouse and store are needed questions of communal policy and management arise and demand solution. This stage has little or no relation to the labor situation, for although there may be no intimate contact between the men themselves, there is still a reasonably personal one between the bosses and the men. As the organization increases in size, however, and this last personal touch is lost, complaints and grievances seem to grow more frequent—not because the occasions for them occur more often than when fewer men composed the community, but because they are not voiced and settled as quickly as is possible in the more intimate associations of the smaller camp, and are allowed to smolder in the minds of the workmen until they burst into flame. Evils may be corrected as soon as they are made known, but some resentment that unsatisfactory conditions should have been permitted to exist often remains.

As the development of the mine progresses ore is struck and production is in sight. This is the time when things usually begin to happen. Men and houses are needed. The bosses are so engrossed with production possibilities that they have no time for civic problems—for the equal and consistent development of the community along with the mine. Everything is needed quickly. Instead of houses, shacks are built; instead of streets, one finds alleys and trails; instead of sewers, there are latrines, and instead of decent and civilized recreation, the red-light district and the saloon.

In many instances, community problems are given some consideration and thought, but the operators are at a loss what to do. They cannot know at that time that the camp is to be a permanent and paying one; they know nothing as to the size and extent of community influence. As a rule, they do not realize that money spent in the development of the town is in any way related to the success of the mine. It is not until some pressure is brought to bear that the operator begins to understand that he is not only developing a mine but a city as well, and, somewhat reluctantly, he begins to provide a few of the things necessary to a well-organized community.

Labor Troubles Spring From Bad Conditions

It is usually during this period that labor troubles have their inception. Living conditions, as a rule, are bad, and working conditions are not as good as they might be. The camp is unhealthful. Then, too, the mine is not yet on a paying basis, and wages are consequently low and the management is slow to spend money not directly related to immediate production of more money. Troubles are frequent, and grievances numerous and often real, and from this time on the feeling grows that the camp is operated in the interest of the company only. Workmen become disgusted and leave, and in this way the community gets a bad reputation in the mining world.

It matters little whether or not these grievances are later corrected. The reputation remains, and often will remain for a generation. Traditions are hard to live down. Even in the present day, one hears occasionally in camps of the West: "Don't go to Bisbee; they have typhoid epidemics regularly." This, in spite of the fact that the conditions causing typhoid have been removed for many years, and that the disease is now almost unknown in that camp. Bisbee is one of the most clean and healthful mining camps in the country, and yet occasionally this feeling against it, which is a purely traditional one, finds expression.

The next stage in the life of the mine is that of stable production and consistent profits. Mining operations have now become so systematized that attention may be given to the study of town problems. Occasionally the sudden realization of the need of this brings a bad condition of hastily thought out and poorly devised remedies, which, in some cases, are worse than the original conditions. The normal procedure, however, is the slow and laborious development of the community, a process often much more costly than if it had been developed simultaneously with the mine. Faulty living, social, recreational and civic conditions are changed, one by one, as the operating heads have the time to devise correct methods.

Hard to Convince Men of Company's Good Will

The feeling of the average laborer in the town is not changed, however, for in the short time spent in the place he has not seen enough of the corrections to be convinced that the company really does desire to make conditions good and to improve his lot. A miner seldom witnesses the entire development of a camp. As a rule, he works a few years here and a few there. He hears disagreeable things and often goes to a camp with a prejudice against it—and he is the man with whom the company has to deal.

The last stage of development comes with old age, the deposit worked out, the camp moribund, and the community likewise. Even here, however, some development may be going on, and the satisfaction of the men during this period is dependent upon the conditions that have existed in the previous stages.

It would be entirely possible to derive from the situation described a system of classification of mining communities, based on the relation between the stage in the life of the mine and the first attention given to community problems, and thereby measure the comparatively harmonious condition of the community and its relative freedom from social dissatisfaction and labor disturbances. A common exception to the normal procedure described is the case of a mine coming into existence in a community already organized and partly developed. Another is that created when a new company acquires a developed mine. In instances of this sort, the tradition feature is of necessity ignored.

A few specific examples may well illustrate the relation between the start of the period of community development, the length of time that it has been going on, and the results accomplished, as well as the relation to the labor situation. It is also significant to note the relative strength of labor unions under different conditions. The strength of unions is dependent largely upon the factors mentioned, weak unions usually indi-

cating the lack of need of strong organizations. When this need develops, a forceful and influential union will take form.

Copper Queen Long Active in Community Work

The Copper Queen branch of the Phelps Dodge Corporation, situated at Bisbee, Ariz., started community work soon after reaching the producing stage. This work has been going on for so many years that little has been left undone, except those things that are brought about by changing conditions and the constant increase in the size of the town. The company pursues the policy of endeavoring to foresee the needs of the community and providing for them, and for this reason its traditions, for the most part, are favorable and creditable. It has provided the best living, working and social conditions. Good homes, good schools, excellent clubs, a fine library, good baseball and other athletics and good music are included in the social advantages to be found in Bisbee. Pension, benefit and bonus systems provide additional remuneration and security. Safe and well ventilated mines, with the latest sanitary conveniences, assure good working conditions. The result is a satisfied community of loyal workmen, where there is a feeling of security and stability, with little likelihood of labor disturbance. Labor has found it unnecessary to organize, and consequently the unions are not strong and include only a small percentage of the employees. This condition, however, is the result of years of painstaking consideration and diligence.

An example of the simultaneous development of the mine and the town is that of the branch of the Phelps Dodge Corporation at Tyrone, N. M. At this camp, the mine was partly developed before it was acquired by the company. Complete plans were made for the development of Tyrone as a place to live as well as a place in which to mine copper. Parks were started before streets were laid out, because they took longer to make. Low rents and low cost of living were featured, with the result that a model, stable community has been established at far less expense than was necessary at Bisbee by the Copper Queen. All this has taken time, and is not yet completed, but the company has demonstrated to the workman that his living conditions are as important to his employer as is his work, and this feeling has led to the conviction that he is going to get a square deal.

Different Methods Produce Different Results

The policies of the Phelps Dodge Corporation in its relation to the miner are the same at Tyrone as elsewhere, although different methods of carrying them out have produced different results. At the Morenci branch, the process of community improvement started much later in the life of the mine, and was carried on spasmodically, dependent upon the attitude and willingness of different managers. For this reason, although many things have been accomplished, the effect on the labor situation has been slight. There are instances of men who have been in the camp for 20 years or more who still harbor resentment owing to the fact that some perhaps very minor things that were wanted have not yet been secured and others took years to get. Less has actually been done in Tyrone than in Morenci, but in the latter place it is neither seen nor appreciated. This is due partly to the fact that much of the work was done many years ago, before the question of community development had assumed its present importance. Tradition, and without good reason, hurts Morenci as a place to live and work in, although the company is doing everything in its power to better conditions by means of a consistent program of development.

The matter of community improvement, as it presents itself, is not so much whether it is done, as when it is done. Mine managers have learned that they have responsibility to the community as well as to the mine, and that a part of the profit derived during the life of the mine is to be attributed to the pleasure and comfort put into the life of the community.

Magnesium as a Substitute for Tin

A correspondent in *Metal Industry* draws attention to the possible use of magnesium as a substitute for tin in brass or bronze valve bodies. This is a comparatively new use for magnesium, and though it is not a substitute for tin in all particulars, it is effective in producing a dense metal free from oxides and blowholes. The amount of magnesium used in this work varies from 0.05 to 0.1%, and 1 lb. of magnesium will deoxidize from 100 to 2000 lb. of brass or bronze.

Though the principal action of magnesium is to deoxidize, it has the additional effect of making a denser casting and a stronger metal. It is introduced into the mixture after the brass or bronze has been removed from the fire and is plunged by means of iron tongs or a "phosphorizer." Slow stirring should be continued after the metal has melted from the tongs, to insure a uniform mixture and to give the oxide of magnesium an opportunity to rise to the surface.

Magnesium also makes a more fluid metal, so that more difficult castings can be poured than without its use. Its deoxidizing qualities also eliminate the necessity for the addition of phosphorus.

Peruvian Borax Deposits

The exports of borax from Peru in 1916 and 1917 amounted to about 2000 tons in each year, writes a correspondent in the *Statist*. The Peruvian government derived from this product an export tax of only 2s. per ton. The deposits are extensive, and are situated in the southern part of the republic, in the neighborhood of Arequipa, and are owned and worked, at least in part, by an English company. The great difficulty has been and is the question of transportation, as everything has to be conveyed over a great range of mountains to get to and from the coast. This obstacle has hitherto proved an effective barrier to the development of the district.

Just before the outbreak of the Great War, the English company concerned was in negotiation with the Peruvian government with a view to building a railway to facilitate the development of this area. It was estimated that the line would cost about £300,000, but the project had to be abandoned at the outbreak of the war. It is sincerely hoped that when the war is over the railway scheme will be reconsidered. It would have the effect not merely of developing the borax deposits, but would enable various enterprises to be started in a highly promising region of Peru.

Communism in Practice

SO FAR as can be judged, the Bolshevist rule is nearing its end, and with its fall will disappear the great plan for the immediate establishment in Russia of a communistic millennium, says the *Ironmonger* of Aug. 31, 1918. As set forth in the innumerable decrees issued by Lenine and Trotzky, the scheme for the confiscation of all property and the carrying on of the country's industries for the sole benefit of the proletariat looked remarkably simple, but when it was sought to put it into practice it suited nobody except the robber gang who call themselves the representatives of the soldiers and workmen. The Bolshevist idea of conducting business was that no one should pay his debts and that all undertakings for producing wealth should be managed by the least-instructed classes, who were to compel the better-educated minority to do their bidding on pain of death.

In its early days the Soviet "government" established a national monopoly of foreign trade and appointed a special "soldiers' and workmen's committee for foreign commerce," to conduct it. This committee consists of delegates from the central committee of Russian industries, from government departments, and from coöperative societies, with some representatives of the professional and trading classes, who may have been added, in spite of their being bourgeois, because they can read and write. A body of statisticians was distributed throughout the country to collect particulars of goods which it is necessary to import, and of others that are available for export. When the selling prices of the last named are fixed, the rest is apparently to be done by barter.

Foreign trade relations having thus been settled to the Bolshevists' satisfaction, and other national committees, each controlling a special branch of Russian home industry, such as textiles, tobacco, petroleum and matches, having been set up, the Bolshevists issued a decree, dated June 28, for the nationalization of industry, of course without compensation to the dispossessed. This decree confiscates industrial undertakings generally on behalf of the Russian Federal Republic of Soviets, but at the last moment Lenine and his associates seem to have recognized that it would be impossible, or inadvisable, to rob every small manufacturer of his property outright, and for that reason certain classes of businesses to be appropriated by the state in each particular industry are specifically mentioned, the inference being that those not named, such as small privately owned factories, are not to be interfered with for the present, although, if the Bolshevist "government" should survive, the small capitalists no doubt would be swallowed up also in due course.

It is artfully provided that all the undertakings which by virtue of the decree are declared to be the property of the republic are provisionally to be regarded as "gratuitously leased" to their previous owners. They are to be financed by the old proprietors—a concession they are likely to view with alarm—and the profits are to be distributed as hitherto, while the managers must remain at their posts. The directors and managers are made responsible to the Soviets for the efficiency and the regular working of the business, under pain of confiscation of all their private property and of prosecution before the "people's tribunal." Directors, staff and workmen are to consider themselves as the servants of the republic, and will continue to draw the pay they were receiving when the decree came into force. Coöperative societies are exempt from the decree. The immediate object of these provisions, which are inconsistent with the pure theories of communism, is no doubt to prevent the owners of a confiscated business from winding it up, perhaps in agreement with their employees, and dividing the assets, but the ultimate aim is to convert all trade, manufacturing industry and agriculture in the country into coöperative undertakings. The decision to compel the directors and managers to continue in office is clearly due to the experience that the original plan of running all factories by committees elected by the workmen has broken down in practice, as, in fact, Lenine has admitted it to have done.

Recognizing that no country, however vast, can afford to cut itself off from all business intercourse with the outer world, and that there is no immediate prospect of any other nation adopting communism—especially since Russia has given an object lesson in the miseries it spells—the Bolshevist decree begins by laying down the future status of the organizations which form the principal commercial link between nations, the banks. All Russian banks are nationalized; and no foreign banks will be permitted to trade in Russia, nor may foreigners hold any interest in Russian undertakings or concessions for the development of the resources of the country. But as Russia cannot dispense with foreign manufactured articles, or even with foreign engineers and other specialists, a system of exchange is to be devised under which Russia will pay for such services in kind with her produce. In the meantime, as all outstanding foreign loans and obligations have been repudiated (with the exception of those due to subjects of the Central Powers, the validity of which is recognized by the peace treaty of Brest-Litovsk), it does not seem probable that other nations will show any anxiety to enter into business relations with the Russia of the Soviets.

After ordering all industrial companies to make up their balance sheets at June 30, the decree of nationalization passes to the enumeration of the various undertakings to which it applies. These include all limited companies engaged in boring for petroleum and in iron and copper mining and all undertakings, whether carried on by companies or by private owners, engaged in the winning of silver, lead, zinc, platinum and wolfram. The gold and salt mines which are declared national property are mentioned by name; they include most of the large companies. In the manufacturing branches of the metallurgical industries the decree confiscates companies and private businesses with a capital of one million rubles or more, and all undertakings, no matter what their capital or by whom owned, which are the sole manufacturers in Russia of any specialty. The nationalization of cotton mills is restricted to companies with a capital of at least one million rubles; whereas for woolens, flax, silk or jute mills half a million, and for hemp factories 200 000 rubles are the limits. All electrical and electrotechnical companies with a capital of not less than one million rubles come under the decree.

Some time ago the Bolshevist government had decided to nationalize "Prodameta," the Russian steel syndicate, and "Krovlia," the roofing-sheet syndicate. An order to this effect has now been issued. The Russian iron and steel industry is to be conducted under the supervision of the metallurgical section of the Supreme Economic Council, and all iron and steel works in the country, whatever their size or ownership, may sell their products only through the intermediary of the two nationalized syndicates in question, all of whose assets and liabilities are taken over by the state, the employees being ordered to continue in their respective positions as civil servants. As the shares in the two syndicates held by the Russian banks were confiscated last January, the present order completes the nationalization of the iron and steel industry, but seeing that most of the roofing-sheet works are in the Urals, where the writ of the Soviets runs only in places and intermittently, it is doubtful whether the order will be of much effect.

The Bolshevist leaders have found it expedient to issue a sort of explanation of the glaring contrast between their professions of devotion to the public good and the carnival of murder, theft, and general rascality that is the only visible outcome of their ideals. They have accordingly supplied a friendly German newspaper correspondent with a semi-official account of the "Progress of the Nationalization of Industry" under their rule, which has been printed in his paper. This curious *apologia* admits that the administrative and economic upbuilding of the Soviet republic is an extremely difficult and slow process, made more so because of the great size of the country and the disorganization of the whole fabric of the state by the overthrow of Czarism. But the machinery has now been set up, and the present problem is how to utilize it effectively. Great difficulties in the way of the realization of factory control were created in the beginning by the technicists and engineers, who boycotted the workmen's committees, but at a conference held in March the representatives of 38 technical and engineering societies decided to resume work, "reserving the right to maintain their political convictions," and workmen's control is now everywhere in force. At first it led to much unpleasantness and many misunderstandings, but it is now the rule that all orders relating to technical matters must be obeyed, although the men may complain to the committee.

The nationalization of industry is still in embryo. There are at present three groups of industrial enterprises: first, the numerous factories which are still private property, though the distribution of dividends has been suspended, and all profits go to the state. The second group, which forms the majority, consists of works which have already become public property but have not yet been centralized and which are controlled by the workmen's organizations. The third group, which it is hoped to make the common type, consists of factories which have been taken out of the hands of private owners and of which the control has been centralized. These are classified according to industries, and already the manufacture of paper, sugar and tobacco has been socialized throughout the country. There are 43 paper mills in Russia, but as 13 of them produce 80% of the total output, the 30 small works are being closed down and a central accountancy is to be established for the remainder. This is comparatively simple, "because private interests are no longer considered." "Nevertheless," the Bolshevist statement concludes, "the position of the Russian industry is still very difficult and grave." So grave, indeed, that under the rule of visionaries and knaves whose one idea is the abolition of all property, except what they themselves can lay hands on, it is certain that there can be no hope of orderly progress.

The Tata Iron Works

American engineers have always had a particular interest in the Tata Iron Works, of India, which were built by an American engineer, Charles P. Perin, who has long continued to be the consulting engineer of the company. There has been a general impression that these important works were the investment of a foreign company, which was in no way the case, the inception of them, the financing, and the management generally having been due to a native, the late Jamsetjee N. Tata, who may be correctly characterized as the pioneer of India's industrial development. He died in 1904, but his work has been carried on ably by his sons, Sir Dorab and Sir Ratan. Sir Ratan died recently in Cornwall, at the age of 47. In recent years he had made his home in Great Britain.

The two great engineering projects that the Tata family initiated are the Tata ironworks and the Bombay hydro-electric power scheme. The former, at Sakchi, has made such remarkable progress that, although it was only in 1912 that the first ingot was rolled and the first rails were produced, it was able to render valuable assistance in 1915 in providing the material with which the railway workshops turned out shell cases which were for a time sent to England. In addition to shell cases, the firm has sent many tons of rails to Mesopotamia, and its contribution to the supply of war materials has been a not inconsiderable one.

Great as were the obstacles which confronted Mr. Tata, senior, when he first conceived the idea of building up a great iron and steel industry in India, those which he had to surmount in connection with the Bombay hydro-electric power scheme were even greater, says the *Ironmonger*. His failure to interest British capitalists in the venture served, if anything, to increase the determination to carry the scheme through. India provided the money, and so saved the Bombay scheme from what befell the Victoria Falls power scheme when the Germans secured such a large proportion of the orders for the plant by taking a financial interest in it, after British capitalists had turned it down.

The Indian Institute of Research at Mysore is another result of the foresight and generosity of the Tata family, the two sons again faithfully carrying out their father's wishes. Sir Ratan Tata, who bought York House, Twickenham, in 1906, was also a remarkable benefactor of Indian reform. He was a lavish supporter of the work of the Salvation Army in India; he founded the Ratan Tata Department of Social Science and Administration in the London School of Economics, and also established the Ratan Tata fund in connection with the University of London, which provided £1400 per annum for the study of the prevention of poverty. He was an ardent advocate of political reform in India, and belonged to the more advanced section of the Moderate party.

Notes on Mining in Alaska

By C. CARLETON SEMPLE*

The status of the mining industry in Alaska is not such as to warrant popular assumptions regarding opportunities and possibilities in that field. Profitable exploitation of mines situated inland is hampered by lack of transportation, high cost of power and scarcity of native labor, and although deposits near the seacoast can be operated to advantage, their number is small. Fishing is by far the most important industry in the country today, and offers the greatest promise for the future. Pulp woods abundant on the coast.

THE mining industry in Alaska is experiencing, in common with all other industries in the territory, a shortage of labor, which first began to be felt last season, but which now has reached such proportions as to threaten a reduction in the output of producing mines and seriously to handicap the development of others. Steamers which heretofore at this season of the year have been bringing people in, are now overcrowded on the return trip to Seattle, and the exodus is general from all places in the territory. In fact, it is difficult to secure outgoing reservations even a month or six weeks prior to the sailing date. In former years, travel southward did not reach steamer-carrying capacity until after the first of September, but since spring this year all southbound steamers have had full passenger lists.

Fishing Is Principal Industry of Alaska

The Alaskan fishing industry is now of greater importance than ever before, especially the salmon canning, as great quantities are being demanded by the Government for part of the ration for the Army in France. The season's catch promises to be a record breaker, and fishermen are making so much money that men are leaving the mines to join their ranks. Earnings of $15 a day are not unusual, and some hauls have brought in as much as $300 per diem for the men making them. Cordova has 11 canneries, and the town is so crowded with people in the fishing business that rooms and houses command high rentals and are difficult to secure. It is said that the Government has ordered the steamers to carry salmon in preference to ore until all the salmon thus far packed has been transported, and the result is that 5000 tons of Kennecott ore at Cardova is waiting shipment.

Activities of Kennecott Copper Corporation

The most important event of the year in the Copper River district was the taking over by the Kennecott Copper Corporation of the Mother Lode property, adjoining. This transaction assures the development and operation of a good property, which has produced high-grade ore in a small way and will add materially to the longevity of Kennecott. The Mother Lode adjoins the Jumbo and Bonanza mines of the Kennecott company, but lies on the other side of the mountain. The Mother Lode company built a 14-mile wagon road from its property to McCarthy, and used both horses and auto trucks for haulage. Some ore was produced for shipping by crushing and washing in a bull jig after preliminary sorting. The company built a power plant at McCarthy and developed electric power by steam, using fuel oil. A two-phase generating installation serves a three-wire three-phase transmission system, connection with the latter being made by means of T-connected transformers, which effect the transposition with rather a heavy loss.

The Kennecott Corporation is now completing a 650-ft. drift from its Bonanza mine into the Mother Lode, and, when completed, the ore from the latter will be hauled into the Bonanza mine and from there sent to the mill or loading pockets at the railroad terminal. Kennecott products comprise high-grade ore sorted at the mine; screenings, which contain about 16% copper and comprise all material coming into the mill that will pass a 9-mm. trommel after preliminary crushing in Blake crushers; Hancock jig and table concentrates, and precipitate from the ammonia leaching process. All these products are shipped in sacks, and as storage space at Kennecott is restricted, delays in operation of the railroad necessitate storage along the railroad right of way at convenient points, with the attendant labor of rehandling.

Developments of the North Midas Copper Company

The only other mining activity in the Copper River district is in the Kuskulana Valley outside of Strelna, about 14 miles east of Chitina. For many years operations have been carried on in this district in a desultory way on a number of claims where a little copper ore was found, but nothing of promise resulted. Some time ago the North Midas Copper Co. discovered the outcrop of an auriferous pyrite vein in a porphyry intrusion at a point some distance down the hill from the site of the exploratory drifts which it had driven in searching for copper ore. Assays of the outcrop showed sufficient gold to warrant development work, and the property now promises to develop into a good mine.

The vein dips at an angle of about 45° and appears to be a persistent fissure in the porphyry, mineralized with massive and crystalline iron pyrites which carries gold, with a maximum width of 5 ft. It has been developed by a drift about 200 ft. along the strike, and by winze and a lower crosscut tunnel to a depth measured along the dip about equal to developments laterally. The ore averages $35 per ton in gold and silver, although a shipment of 25 tons made this spring from the upper part of the vein brought a return of $80 a ton. The company, of which O. J. Berg is manager, is building a 10-ton mill under the direction of C. N. Anderson.

Treatment will consist of reducing the ore, first in a Blake-type crusher, then to ½-in. size in a roll-jaw crusher, and grinding to 150 mesh in solution in a ball mill, with a Dorr classifier in closed circuit. An Oliver filter will be used, and the gold from the cyanide solu-

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tion will be precipitated in zinc boxes. During the season when water is abundant the mill will be driven by water power, and either steam or oil engines will be used throughout the rest of the year. It was expected that the mill would be ready for operation this summer, but work is proceeding slowly.

Other Developments in Copper River District

Adjoining the North Midas, Thomas Lynch, of Strelna, owns a group of claims on which he has found ore at the surface, the character of which is identical with that found on Berg's property, and the surface exposures so far uncovered seem to be in the line of strike of the North Midas vein. The ore assays $25 per ton in gold and silver. No work has been done, other than a little prospecting, but the holding, by virtue of its situation, is one of the most interesting in the region. The Chitina-Kuskulana Copper Co. owns property near that of the North Midas. Louis Kleyle, of Pittsburgh, is manager. Work is progressing on a small scale, consisting mainly of the driving of a tunnel.

The Alaska Copper Corporation development is situated on the opposite side of the Kuskulana River from the holding above mentioned. Last year this company built a 20-mile road from Strelna, on the Copper River & Northwestern Ry., to its mine at Nugget Creek. This road crosses a large expanse of swampy tundra, and, with the idea of preventing the thawing of frozen gravel, it was built on top of the moss. It has been found in Alaska that, if the moss is removed, summer thawing takes place with greater rapidity than the winter freezing, or, in other words, the depth to permanently frozen ground increases year by year. Building the road on top of this moss has resulted in an irregular surface, which is now being put in condition by surfacing with gravel. As the gravel will sink through the underlying moss until it rests on the frozen ground, several seasons' work will be required to put the road in good condition. All the hauling for the properties on the south side of the Kuskulana River is over this road, and previous to its construction transportation was over a trail swamped out through the timber, the ground for the most part being soft and swampy, making frequent changes of route necessary. Heavy hauling was possible only in the winter, when the ground was frozen.

The Alaska Copper Corporation has two three-ton Packard motor trucks with Troy trailers, a Franklin and a Ford car for light service. No hauling by the trucks is to be attempted until the first graveling of the entire road has been completed. For 18 miles the road has easy grades, but the grade on the last two miles to the mine is so steep that the purchase of a caterpillar tractor is being considered.

Experimental Mill of Alaska Copper Corporation

The Alaska Copper Corporation is developing a copper deposit which occurs as the filling of a fault fissure in greenstone. The vein filling is calcite in which bornite exists in irregular bunches and masses. Last spring, when I was in charge of operations, I built a small experimental mill of about two and one-half tons per hour capacity. The mill comprised a 10 x 16-in. Blake-type crusher, roll-jaw crusher, roughing jig and Wilfley table. Both high grade and waste are sorted out before the ore goes to the crushers, which break it to jigging size. The jig makes a 35% copper concentrate and a hutch product which goes to the table for cleaning, the table concentrates containing over 50% copper. Steam is used for motive power. The mill is operated two eight-hour shifts and treats about 50 tons of ore daily.

Exploitation of Coal Deposits Formerly Worked

At Cordova it is announced that work will be started soon by the Bering River Coal Co. at Katalla. Falcon Joslin is president of this company and also of the Chilcat Oil Co., at Katalla. N. R. Van Campen is superintendent of the coal company; George C. Hazelet is manager of the oil company, and Allan M. Bateman is geologist for both companies. The coal company is building roads, establishing camps and bringing in supplies, and a telephone line will be built to Katalla.

The first property on which work will be started is that of an old English company situated on Shepherd Creek, 10 miles above Bering Lake and 20 miles from Katalla. Several entries were driven by the former company, one of which is 480 ft. long and the other 450 feet.

Present Oil Production Insufficient for Local Needs

The oil company has seven wells, which are producing about 600 bbl. per month, and the company also operates a small refinery producing gasoline and other products, but the quantity is so small as to fall far below supplying the requirements of the immediately adjacent vicinity. Katalla is not a suitable place for ocean shipping, as the bay on which it is situated is unprotected, and attempts at dock building are unsuccessful, foundations being quickly washed out.

Should the production of this field ever become large enough to warrant it, a railroad connection would be built to the line of the Copper River & Northwestern Ry., and Cordova would become the port for the Katalla field. The railroad at present runs northeasterly from Cordova, following a line parallel to the coast and in the direction of Katalla for a distance of nearly 60 miles before turning up the valley of the Copper River toward Chitina and Kennecott.

Midas Mine Producing 3000 Tons of Copper per Month

At Valdez, things are quiet, as there is only one cannery at that settlement, and the only mine is the Midas, of the Granby Consolidated Mining, Smelting and Power Co., situated on the shore opposite Valdez. This mine produces about 3000 tons of copper ore per month, which is shipped to the Granby smeltery at Anyox. A Riblet five-mile tramway has been completed, and exploration work on the property is being done by drilling.

Activities on Prince William Sound

The Ellamar mine, on Prince William Sound, is being operated by about 100 men and is producing auriferous copper ore. Ships are loaded in the bay at a loading pocket some distance from the shore, which is supplied by an aërial tramline carrying the ore from large storage bins.

The La Touche mine, owned by the Kennecott Copper Corporation, is situated on Prince William Sound, and is producing between 1300 and 1400 tons of ore daily. The ore contains 2% copper and is milled, concentrates only being shipped. Crushing in gyratory breakers and in Symons disk crushers is followed by grinding in Marcy ball mills. All concentrates are produced by flotation, Janney and K. & K. cells being used. Diesel engines furnish the power. Concentrates from the mill are stored in a large bin. Conveyor belts below the bins are so arranged that concentrate is delivered to a chute directly over the hatch through which it drops into the hold of the vessels, all shipments being made in bulk. The adjoining copper property has just been sold to the company operating the Ladysmith smeltery, on Vancouver Island. Some development work has been done, and a small dock and ore pocket have been built.

Chrome Deposits Under Development

One of the most interesting properties in Southwestern Alaska is that of Capt. George Whitney, at Port Chatham, at the entrance to Cook Inlet and near Seldovia, where a deposit of chromite is being developed. The existence of this ore has been known for a number of years, but little work was done, although a few shipments had been made. This year 600 tons of ore containing not less than 40% chromic oxide has been shipped to the California Electro-Metallurgical Co. The ore is at present netting about $60 per ton after payment of transportation charges. All ore thus far mined has been taken from the outcrop close to the water's edge; in fact, some of the exposure is covered by water at high tide, and from this point the ore has been traced on the surface for some distance inland. Captain Whitney has purchased the machinery in the old gold mill at Snettisham. Ten stamps and a number of vanners have been delivered at the chromite mine and will be installed when the mill building is erected. A coast survey party is now surveying the waters around Port Chatham to chart the channel, but steamers can already approach within lightering distance of the mine.

Anchorage Affected by Decrease in Railroad Work

The town of Anchorage has experienced a decided drop in population. When railroad work was in progress, the number of residents there was between 6000 and 8000, but it is now estimated at not more than 1500. The railroad line from Anchorage to Seward has been built excepting for 16 miles, and as a Government appropriation has lately been made for continuing the work, it is thought that an attempt will be made to complete the road to Seward, but labor shortage may preclude its being done this season. Some parts of this branch of the road are situated on poor ground and will probably be carried out by slides.

There is no industry at present near Anchorage, and, consequently, little prospect of the settlement developing into a place of commercial importance. The Willow Creek gold district is reached by way of Anchorage, but so far has not developed to the point where it can support a larger seaport town than Anchorage. At Willow Creek a number of gold-quartz properties are under development, the ore being high grade in narrow stringers that are rich at the surface but of unknown content beyond moderate depth. Developments have not yet shown persistence of the veins for considerable distance along the strike. Ohio and Colorado people have recently bought the Gold Bullion property for $50,000 and intend to carry out systematic development work to determine what it can produce. Labor is in great demand, the Gold Bullion mine alone needing 50 more men to carry on its development program.

Conditions in Broad Pass and Broad River Districts Do Not Justify Construction of Railway

Another district entered through Anchorage is that of Valdez Creek, where George Sias is developing placer deposits. Aside from activities at Willow Creek and Valdez Creek, there is no prospective industry in the region of the projected railway line to support it when built. It is indefinitely stated that "there is lots of copper in the Broad Pass and White River country," but nothing exact as to its occurrence is ascertainable. Copper stains and nuggets of native copper are found generously distributed over a great extent of territory in more than one place in Alaska, but enough copper concentrated in one place to make a mine is difficult to find. Alaskans themselves, even some of them from Seward and Anchorage, confess that they fail utterly to see what business there is in sight or in prospect of development to support the railroad if it is built.

Gold Mining and Shortage of Labor

At Juneau and vicinity the shortage of labor has caused a marked curtailment in gold mining. The margin of profit at these gold mines is so small that they are unable to pay the wages that miners can obtain in other places either in Alaska or outside. The Ready Bullion mine and mill are running steadily on Douglas Island, but on the other side of Gastineau Channel the big mine and mill of the Alaska Gold Mines Co. at Thane are now operated at less than full capacity and for only one eight-hour shift. At Juneau, the Alaska Juneau Gold Mining Co. is making use of the stamps in its old pilot mill for the preliminary reduction ahead of the tube mills in addition to the ball mills, as it has been found that the latter alone did not satisfactorily crush all of the ore and that the tough slaty material especially escaped reduction.

Fishing Predominant Industry and Promises Most for the Future

The fisheries which extend along the coast from Ketchikan to Bristol Bay and the Bering Sea rank foremost in value of production and offer the greatest promise for the future of Alaskan industrial development. Foremost in production is salmon, the greater part of the catch being shipped canned, although some is dried and salted. The Government this year is taking 65% of the catch, and the season promises to be an extraordinarily good one, the question of tin plate apparently being more of a limiting factor in production than run of fish. It is said that in Bristol Bay especially the runs have been good and that some canneries have already made their full season's catch. Herring fishing ranks second to salmon, and a number of salteries are now making a large output of salt herring packed in barrels. There are also a few clam canneries, and a considerable catch of cod and halibut is made to supply Pacific Coast demand.

Alaska's great mineral wealth has been so grossly exaggerated as to be disappointing to one who is acquainted with the centuries-old fields of Mexico and Central America. There is no question that the country has so far been only scratched and that vast territory remains unknown, but the obstacles to development are great. New gold mines, either placer or quartz, are being discovered, and, when the deposits are of sufficient size and the grade of the ore is high enough, the difficulties of transporting in machinery and supplies can in general be overcome, for there will be no question about getting the product out. Base metals, on the other hand, present problems that will restrict operations for a long time. In fact, it can be said that mines of copper, lead and other base metals, when situated in the interior, to be profitably developed must be of large size and produce either exceedingly high-grade ore or ore amenable to those concentration processes which will give for shipment a product rich in those metals.

The transportation problem is difficult of solution and constitutes a serious obstacle to industrial development. Most Alaskan rivers are not navigable, building of railroads requires large capital, and usually the mine for which the railroad is built will provide the only traffic it will haul. Road building for motor truck or hauling by teams is expensive and feasible only for comparatively short hauls, so that the only optional proceeding is to confine hauling to the winter time, when the ground and rivers are frozen and covered with snow, so that haulage by means of horses is practicable.

Power from water can be developed in a few places, and for several months of the year would be unavailable, on account of the prevailing low temperatures; it is often difficult or impossible to obtain water for milling purposes, as all streams are frozen up, and unless springs that flow the year round are found, there is no recourse except that of thawing ice and snow. Again, there is no large native population to draw on for laborers, and what little white labor is obtainable demands and receives good wages in addition to board, which ranges all the way from $1.25 to $2 per man per day. Even were Alaska's coal fields producing a good grade of coal in abundance and cheaply, its transportation to a mine situated in the interior would be costly.

An idea of the cost of fuel oil may be obtained from the figures of a mine operating 20 miles from one of the railroads. The oil is brought from Seattle in 108-gal. drums and at Seattle costs 5½c. per gal. Upon its arrival at the mine, the oil has cost 35c. per gal., including return freight on the empty drum. Of course, where oil can be shipped in quantity and handled in tank cars, the transportation cost is less, but it requires a copper mine such as the Kennecott to warrant provision of such transportation.

Mines Situated Near Coast Offer Opportunity for Profitable Operation

For mines situated on the coast close to deep water, conditions are good. There it is entirely possible to operate at costs that will compare favorably with those obtaining in any other mining field. The winter is not so severe as in the interior, and the proximity of the ocean solves the one great problem of transportation. A mine the ore from which yields 2% copper, situated on salt water, is now being profitably operated, for it can turn out a good grade of concentrate for shipment by the all-water route, and only one handling between mine and smeltery is required. Of two mines having large and equal resources in terms of tons of metallic copper, one situated on the coast and having 2% ore, the other in the interior but having 40% ore, the profitable working of the former would be assured, whereas the high-grade mine, unless well situated and close to a railroad, would be a questionable investment.

Shortness of Growing Season Restricts Agriculture

Some enthusiasts have written in glowing terms of the possibilities of agricultural pursuits in Alaska. Such boasting is ridiculous. Though it is true that some produce is grown, the amount is small. There are vast stretches of land rich in plant food and favorable topographically for farming, but winters in Alaska are long and bitter, and the summer season is short and uncertain, and few crops would mature. Farm labor also would be costly, but the greatest of all obstacles to farming would be disposal of any crop grown. Caring for livestock through the long winter would be so expensive as to preclude its being practiced; shipment of crops as harvested would be out of the question, and local consumption would not provide a sufficient market. With great areas of good farm land in the South still undeveloped, Alaska is the last place on the continent for the successful promotion of agricultural pursuits. The only business of the kind that seems to have a future is the raising of reindeer. The herds the Government brought in have increased and done so well that 35,000 are being exported this year for meat, and an abundant supply of reindeer meat would certainly find a ready market for years to come.

Good Possibilities for Pulp-Wood Production

Of all Alaska's potential resources, there is one that offers a profitable field for investment which has so far not been exploited or developed. From Ketchikan northward and westward along the coast lie thousands of miles of timber land covered with spruce, fir, hemlock, larch and cedar, some of which is suitable for lumber and all of which, except the fir, will make excellent pulp wood. Water power can be developed in certain parts of the coast line, and where that possibility exists conditions are almost ideal for paper making. Several paper-making plants are now in operation along the coast of British Columbia, which enjoys no advantages that cannot be found in a score of places along the coast of Southeastern Alaska.

Stone Tube-Mill Liners have been obtained from three districts in the United States, one near Iron City, Tenn., where the "Fort Payne chert" is utilized; a second in Florida, in the region of the outcrop of Ocala limestone running from Suwanee County to Hillsboro County; a third at Jasper, Minn. The flint, or chert, and quartzite from these districts are almost pure silica, tough and hard, and are worked into dimension blocks, which have proved wholly satisfactory, according to U. S. Geological Survey reports, all manufacturers claiming increasing business with repeat orders.

The Distinction Between Extraction And Recovery*

BY A. W. ALLEN

Standardization is the need of the times. Its adoption leads to the systematization of operations and the concentration of effort. It promotes elimination of wasteful variation, and assists in the clarification of ideas by disregarding the unnecessary. The method of statement of result in many metallurgical operations is an example of the ambiguity of the phraseology in common use—an ambiguity that often obscures the net economic result and renders the disseminated information valueless. This paper deals with the standardization of the terms "extraction" and "recovery," and defines and limits their use in connection with many metallurgical operations and processes.

SOME years ago I had the temerity to say[1] that "extraction and recovery are terms which are not necessarily interchangeable, and the time is ripe for the recognition of the fact." The distinction is being recognized in some quarters, although custom still makes it difficult to use the words in their true sense without an appearance of meticulous precision.

The fundamental idea underlying the word "extract" is "withdrawal"; its definition in a technical sense is "to withdraw by treatment with a solvent or other means." Thus, copper may be withdrawn or extracted from the crushed ore by flotation or by means of an appropriate acid solution; mercury may be extracted from cinnabar by heat; or gold may be extracted from its ores by amalgamation with mercury. The amount extracted is usually estimated by an analysis or other determination of the ore before treatment, and the residue, or tailing, after treatment. The extraction is obtained by difference.

Extraction Is Usually the First Stage of the Process

Metallurgical processes are usually divisible into two principal stages. The first is concerned with the preparation of the ore and the extraction of the valuable metal, preferably in a concentrated form. The product sought is sometimes associated in nature with a mineral or minerals having physical characteristics which differ from those of the surrounding rock material, and this facilitates extraction. In other cases a solvent is added to withdraw the metal in dissolved form. In some instances heat may be used to extract it. The second stage is for the purpose of obtaining a final product from the concentrated mineral, solution, or gas; and usually in metallic form. The actual amount obtained indicates the "gain," or, to use a more appropriate word, the "recovery." Both extraction and recovery are customarily estimated as percentages of the original metal content of the ore. Extraction invariably exceeds recovery, but the amount recovered is the crux of the matter—it is the determining factor as to whether the process is suitable and is being efficiently performed. Extraction is an indication as to how the first stage is progressing; it shows how much is being lost in the tailing or residue, but it tells nothing as to how much is being gained or recovered in the final product.

Parallel Example of Difference Between Extraction and Recovery

The difference between extraction and recovery is best shown by a simple illustration from those business operations which are usually considered so far removed from technical work. A storekeeper marks with satisfaction the depletion of the goods on his shelves as the month advances. He has a system which enables him to keep an accurate check on the wholesale and retail prices of everything sold. At the end of the month he compares these figures, and estimates the theoretical profit made; but he is far from content with this as a final appraisal of the net result of the work. To find out exactly where he stands, he needs a more tangible factor, so he checks the cash received and bases his profit on that. When there is a big difference between theoretical estimates and actual returns, he looks to see where the discrepancy occurs, and endeavors to eliminate the errors and mistakes, the losses and thefts. The final result is measured by cash received, not cash that would have been received if the whole series of operations had been carried through without a hitch, mistake, or loss. The need of close and logical accounting in metallurgical work is just as important as it is in commerce—perhaps more so. To distinguish properly between extraction and recovery is the first step toward realizing the vital importance of net economic result, and the secondary, though helpful, value of the theoretical estimate.

An Almost Complete Extraction May Be Obtained by an Impracticable Process

I was once called upon to report on the treatment of a highly refractory auriferous ore. At that time the volatilization process was attracting attention, and I made a number of tests to determine what results I could get by roasting with salt. To my surprise I found no difficulty in obtaining a residue that indicated an extraction of 97%, and this on a comparatively low-grade ore. The results were encouraging, but the more important stage of the process was yet to come. The volatilized gold had to be collected in salable form, and this is where the process failed; for nearly half of what had been extracted was lost in all attempts to condense and collect. There was no trouble about withdrawing the gold from the gangue—the extraction was high; but the net gain was so small that the process was deemed infeasible—the recovery was too low.

Cyanidation has often been adopted because high extractions of metal could be obtained in experimental

*The first of a series of articles on the standardization of terms used in hydrometallurgical operations.

[1]"Descriptive Technology," *Trans.* A.I.M.E., Vol. XLIX.

treatment. The day of reckoning has come later when an actual yield is obtained, and when it is realized that there are a thousand and one opportunities to lose the metal after it is extracted and before it is recovered. An estimate of extraction is always an excellent guide in preliminary work and also in connection with full-scale operations; but the superiority of a process is determined by ultimate net result, and comparisons can be fairly and satisfactorily made only by considering the controlling factor of actual gain or recovery.

Extraction No Gage of Efficiency in Many Instances

The leaching treatment of copper ore is analogous to cyanidation as far as the foregoing considerations are concerned. After the metal has been extracted in dissolved form, there is a possibility of loss at every stage of the subsequent process. If actual recovery can be made to approach closely to theoretical figures, so much the better. The results are commendable, and reflect alike on equipment and operation. If there is a considerable difference, which is often inexplicable, then let the recovery figures indicate the final result. When the product is obtained as a metal, these figures are always obtainable, and are alone of significance. To state that an extraction of so much per cent. is obtained usually leaves the reader mystified as to whether the recovery process is a success or a failure.

Extraction a Phase of a Recovery Process

The question may be raised as to whether an incomplete metallurgical treatment can result in a recovery of a product. Recovery treatment may be said to start when the mechanical preparation of the ore is completed; or the two may overlap. Extraction may be considered as a phase of a recovery process, although the reverse is not true. If the winning of the metal stops when it is obtained in the form of concentrate or base bullion, it is obvious that something is recovered. The character of the recovered material should be stated, in addition to its metal content. The worth of the final estimate depends on the accuracy of the figures used—the more concentrated the final product the easier will be the task of arriving at a correct estimate. Hence the term "recovery" is best used when refined metal is produced, and "extraction" when the product is in a concentrated but not a melted and refined condition.

A further distinction is seen between the words when it is understood that recovery of metal can be based only on actual yield in metallic form. Extraction, on the other hand, may be based on the assays of ore before treatment, and residue or tailing after treatment; or it may be calculated from the net weight of concentrate or base bullion produced, in terms of metal content. Hence the difference between assay extraction and actual extraction, which has already[2] been defined as follows:

The assay or theoretical extraction is the amount of metal which is indicated by assay results as having been removed from the ore during treatment.

The actual extraction indicates the amount of metal removed from the ore and isolated in concentrated form. Such actual extraction is based on figures representing the actual metal content in the concentrate, base bullion, or other material produced.

To summarize:

1. The final product of metallurgical treatment should be estimated and reported as a *recovery*, in percentage of the original content of the ore, when the yield is refined metal.

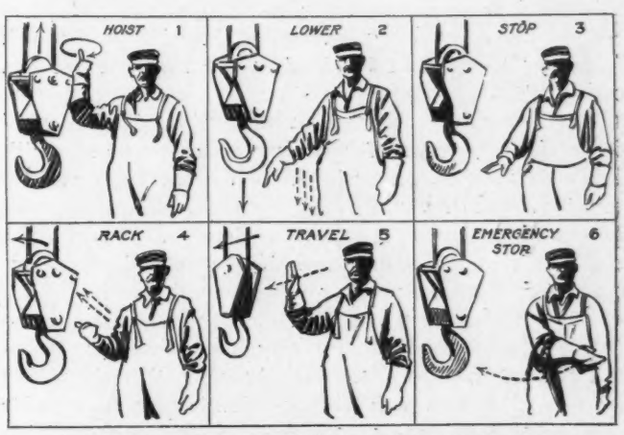
2. When metallurgical operations are incomplete, and a concentrated but not a refined product is obtained, the metal content should be reported as an *extraction*, also in percentage of the original content of the ore.

[2] *Ibid.*

Uniform Crane Signals

The Industrial Board of the Pennsylvania Department of Labor and Industry has adopted, among other safety standards, uniform crane signals. The same signals, which are illustrated in the accompanying cut, have also been recommended as a standard by the Safety Engineering Board of the Emergency Fleet Corporation. The signals are described as follows:

1. Hoist—Forearm vertical. Make small horizontal circles with the hand.



UNIFORM CRANE SIGNALS, AS RECOMMENDED

2. Lower—Arm extended, hand below hip, wave forearm downward.

3. Stop—Arm extended, hand level with hip. Hold position rigidly.

4. Rack—Arm extended, hand just above hip, fingers closed, thumb extended horizontally, jerk hand in direction of racking.

5. Travel—Forearm vertical, hand open. Wave forearm in direction of travel.

6. Emergency Stop—Arm extended, hand level with the hip. Move hand quickly to right and left.

The signals should be posted in all crane cages and should be observed only when they are given by the proper person.

Tin Production of Bolivia.—It is expected that the tin production of Bolivia in 1918 will be equivalent to a yield of 28,000 to 30,000 tons of pig tin. The major part of this is derived from seven mines, which in 1918 are expected to produce about 26,000 tons. The chief producers are Llallagua and Patiño. Bolivian official statistics calculate tin concentrates on the basis of an average yield of 60%, but in commercial opinion the present average is nearer 62%. Llallagua is supposed to get about 70%, and the Patiño mines about 65 per cent.

The Manufacture of Zinc Oxide At Monteponi*

By F. Sartori

The idea of making zinc oxide directly from ore was first advanced in Monteponi as early as 1881, by Mr. Ferraris, who was the original investigator and who assigned to the Societa di Monteponi a patent based on the use of ammonia. Interesting experiments were made between 1890 and 1900, but none of these was on a large scale. About 1905 some experimental treatment of zinky lead slag was undertaken in small blast furnaces of special design.

It was not until May, 1906, that, in view of the necessity of treating the zinc-bearing ores of dolomitic gangue of the type predominating in the Monteponi mines, the idea of using a converter instead of a blast furnace originated. The first series of experiments, although encouraging, were abandoned, for several reasons, but were resumed in 1908. The time required to get this far may seem long, but many tedious, tentative efforts were necessary in order to devise a process meeting satisfactorily the special conditions of Sardinia, where coal is poor and costly. This indicated the need for something different than the Wetherill process, used in the United States, which requires from 1 to 1.5 ton of good anthracite per ton of ore.

The new patent assigned to the Societa di Monteponi describes a process of reducing zinc ore mixed with lean coal in a converter lined with refractory material and blown with air at high pressure. The converter is placed under a combustion chamber wherein the zinc vapor and carbon monoxide are burned, the products of combustion passing first through the flues of a steam boiler and thence to a baghouse. As an alternative process, the converter is started under a separate hood until all the moisture in the charge is eliminated, after which the operation is continued under the combustion chamber, as first described. The first converter was installed at Bellavista, about the end of 1908, and was followed by three more converters, which were provided with a separate cooling and filtering system. For the treatment of fine material it became necessary to build a plant to briquette the mixture of ore and fuel.

Eventually a new plant was erected at Scalo, near the Monteponi station of the Royal Sardinian railway and the Portovesme-Monteponi railway. In this plant the steam boilers following the converters were omitted, the experience at Bellavista having been unsatisfactory. The space between the boiler tubes choked up after a few hours' run. The question of the utilization of the heat produced in the combustion of the vapor and gas is therefore still open.

The Scalo plant is divided into two sections, the first having been put in operation in 1914, and the second in 1917. Each section consists of five furnaces, with supplementary oxidation chambers, cooling pipes and baghouses. The converters are brought from the hoods to the furnaces by means of electric trucks. The blowers, exhausters, and all other machinery of the plant are electrically driven.

The baghouses are of reinforced concrete, but the rest of the plant is comprised in a light steel structure roofed with galvanized sheet iron, the north side only being closed. The plant is operated continuously with three eight-hour shifts.

For fuel, anthracite from the mines of Corungio, developed and operated by the Societa di Monteponi, is used. This coal carries from 16 to 20% of ash, which is a cause of serious trouble in the production of zinc oxide; wherefore means for washing the coal are now being installed at Corungio.

At first the Monteponi zinc oxide was regarded suspiciously in the market, owing to its being a new thing and also because it is not quite so white as the product obtained by burning metallic zinc. However, the trade soon discovered that the paints prepared with it were excellent, the zinc oxide being of extremely fine character and capable of a perfect mixture with oil without the need for further grinding or classifying. These paints possessed high covering qualities, rapidly drying character, great durability, and high enameling properties. The zinc oxide contains about 8% of lead, which is present entirely as sulphate.

The total production of zinc oxide in the Monteponi plants has been about 13,000,000 lb. A production of 3,500,000 lb. in 1917 was expected, and might have been obtained if the fuel supply had been adequate.

*Abstract of a paper in Resoconti delle riunioni dell' "Associazione mineraria sarda," December, 1917.

Mercury Losses in Retorting*

By A. Thomas

I am inclined to think that estimations as to the loss of mercury during retorting are exaggerated and that the retorting plant is debited with deficiencies which really are due to the presence of water in the amalgam. To determine the actual mercury loss which takes place, the water present in the amalgam must also be estimated.

Some time ago tests were made, under working conditions, to find out the amount of water present in amalgam. A receptacle was placed at the discharge end of the condensing chamber to receive the moisture which came off from the retort some time before the mercury, and from 39,163 oz. of amalgam, 421 oz. of water was recovered, equal to 1.07%. Results from more recent tests indicated that 12,612 oz. of amalgam yielded 80 oz. of water, equal to 0.634%, which indicates that the percentage of water in the amalgam is not constant.

Usually the amount of mercury called for after retorting is the difference between the weight of retorted bullion recovered and the weight of amalgam. I regret that at the present time I am unable to give data showing what the actual mercury loss is while retorting amalgam, as it should to be taken over a period to be of value. There should be little loss of mercury while retorting if due care is exercised in conducting the operations, sufficient heat and time being allowed for the complete vaporization. Close-fitting joints on the retort doors, and proper condensing chambers are imperatively necessary.

Gold Nuggets are still being found in Australia. One recently picked up at Castlemaine, Victoria, weighed 17 oz. and was valued at $320.

*Excerpt from Journ. Chem., Met. and Min. Soc. of South Africa.

Smelting and Lead Refining at the Bunker Hill Plant*

By C. T. Rice

Details of the design and operation of the blast furnaces and types of blowers used. The arrangements for lead tapping, the sizes and types of sundry equipment, and modes of conveyance of the various products about the plant, are described, including the pumping, by centrifugals, of molten lead. Details of the Parkes process, and the use of Faber du Faur furnaces in refining the products, are accompanied by a number of illustrations.

AN ADDITIONAL blast furnace is to be added to the smeltery at the Bunker Hill & Sullivan plant. Separate spurs lead to the top of each of the existing furnaces, placed at 36-ft. centers (see Fig. 1). As the furnace gases are taken off by a "downcomer" at the back of the furnace and underneath the feed floor, the latter is unobstructed. It is partitioned off from the rest of the blast-furnace building so as to keep out the furnace gases as much as possible, but individual partitions do not separate the charge floor of one furnace from that of another, as at Tooele. The

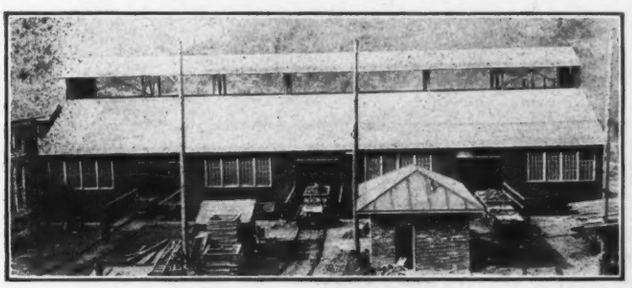


FIG. 1. SPURS TO BLAST-FURNACE BUILDING

charge doors of the furnaces are carried on wheels from tracks inside the charge-car tracks; and under each door is a 6-in. angle-iron spreader for distributing the charge properly in the furnace. Each spur extends out behind in a tail track, so that the charge can be dumped at any point along the furnace. One man attends to the feeding of the blast furnaces, and there are two men on each charge car.

The blast furnaces are 48 x 180 in. at the tuyeres, and were made by the Traylor Engineering Co. The feature of the Bunker Hill furnace is that, like a copper blast furnace, it has two tiers of water jackets above the crucible. Except for the fire bricks in the crucible, the only brickwork about the furnace is the 6-in. layer separating the water jackets from the top plates. Five jackets run lengthwise with the furnace, each jacket having two tuyeres, so that there are 20 to a furnace.

The water, which is pre-heated in the top jackets, goes to the lower bank, and a warmer-running furnace is obtained, and the extra set of overflow pipes that would otherwise be required is unnecessary. A comparatively low furnace results, the distance from bottom of crucible to top of furnace being only 25 ft. The blast for the furnace is furnished by two Ingersoll-Rand turbo blowers, each having a capacity of 12,000 cu.ft. of free air per min. at 48 oz. per sq.in. pressure. These turbo blowers operate at 4700 r.p.m., and are driven by herringbone gears from 200-hp. induction motors running at 1800 r.p.m. Fig. 2 gives an idea of the small floor space occupied.

The lead is taken by a launder, Fig. 3, to a ladle at the front of the furnace, and the slag is tapped into

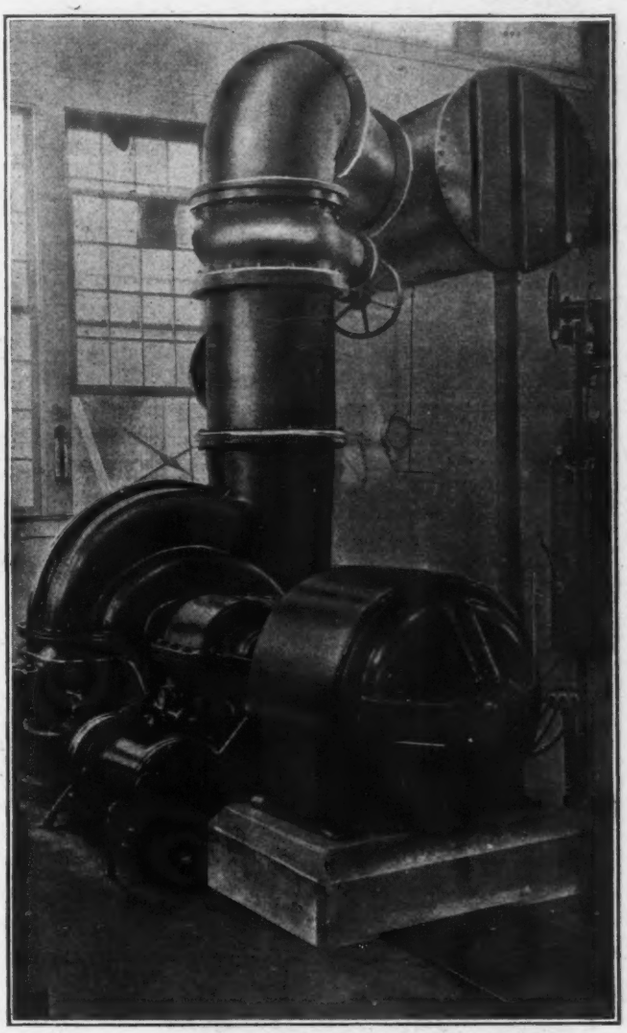


FIG. 2. TURBO BLOWER

two receivers placed in series, Fig. 4. The first of these settlers is 6 ft. in diameter by 3½ ft. deep, and the second is 5 ft. in diameter and 2½ ft. deep. Simple cast-steel slag spouts are used, without water jackets. Being comparatively small, and as the blast furnaces are served by a 20-ton traveling electric crane (Fig. 5), the settlers are changed whenever they begin to slag up, and others put in. In this way their effective settling

*The fourth of the series of articles describing the design and operation of the Bunker Hill & Sullivan smeltery and refinery, that began in the July 20 issue.

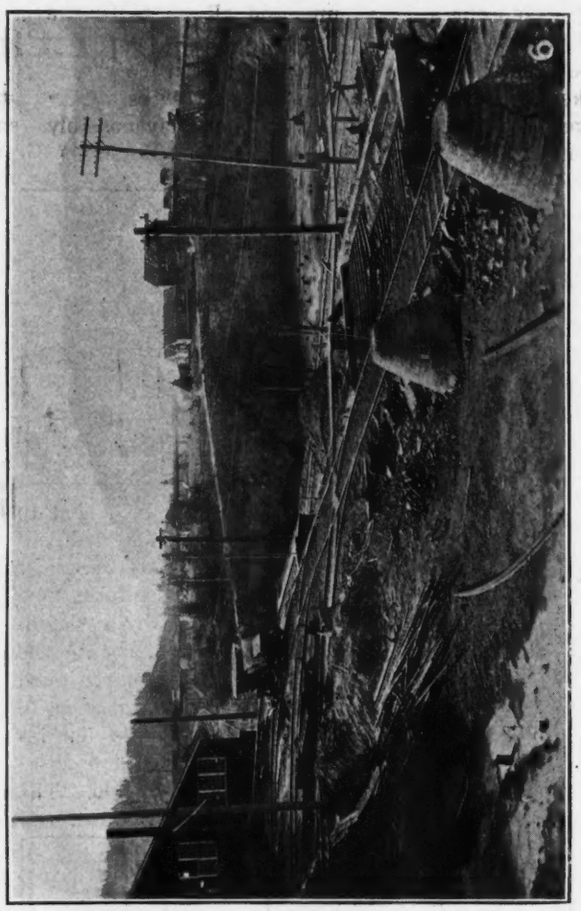
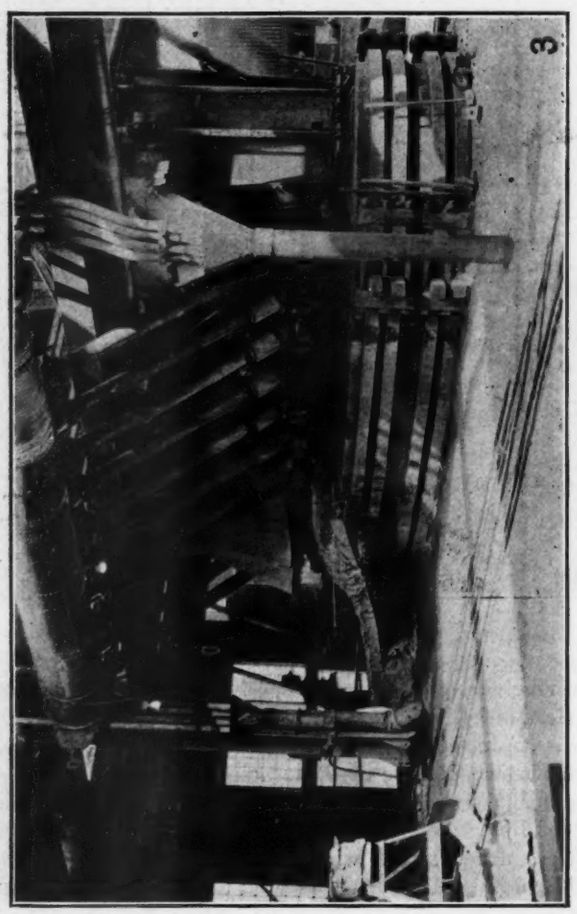


FIG. 4. FRONT OF BLAST FURNACES
FIG. 6. SKULL GRIZZLY



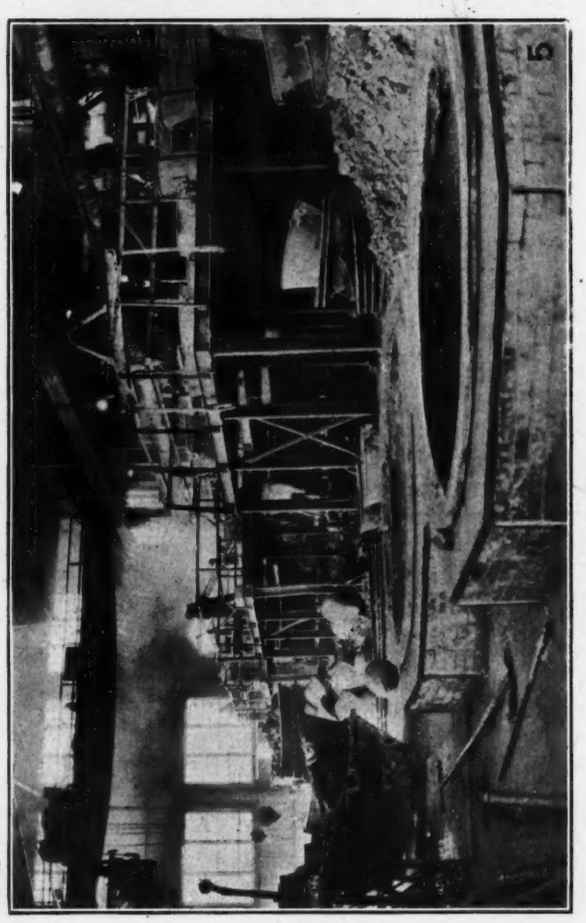


FIG. 3. BLAST-FURNACE JACKETS AND TUYERES
FIG. 5. BLAST-FURNACE AISLE AND KETTLES

capacity is kept at a maximum, and all matte in the slag is caught in them. The shells from the slag pots are, nevertheless, dumped on a skull grizzly (Fig. 6) and broken up for return to the blast furnaces. This is done partly to recover the matte which may possibly have found its way into the shells, but mainly because of the benefit arising in speeding up the furnace by the addition of slag. The matte is tapped from the settlers into small ladles (Fig. 7), handled by the crane, which also takes the lead ladles and pours the contents directly into the drossing kettles of the lead refinery. The slag from the blast furnaces is caught in 130-cu.ft. motor-dumping Treadwell slag pots (Figs. 8 and 9), and taken to the slag dump, a few hundred feet away, in the neighboring gulch, by a 10-ton Baldwin-Westinghouse electric motor. As the blast furnaces are placed at 36-ft. centers, and roomy platforms are provided in front

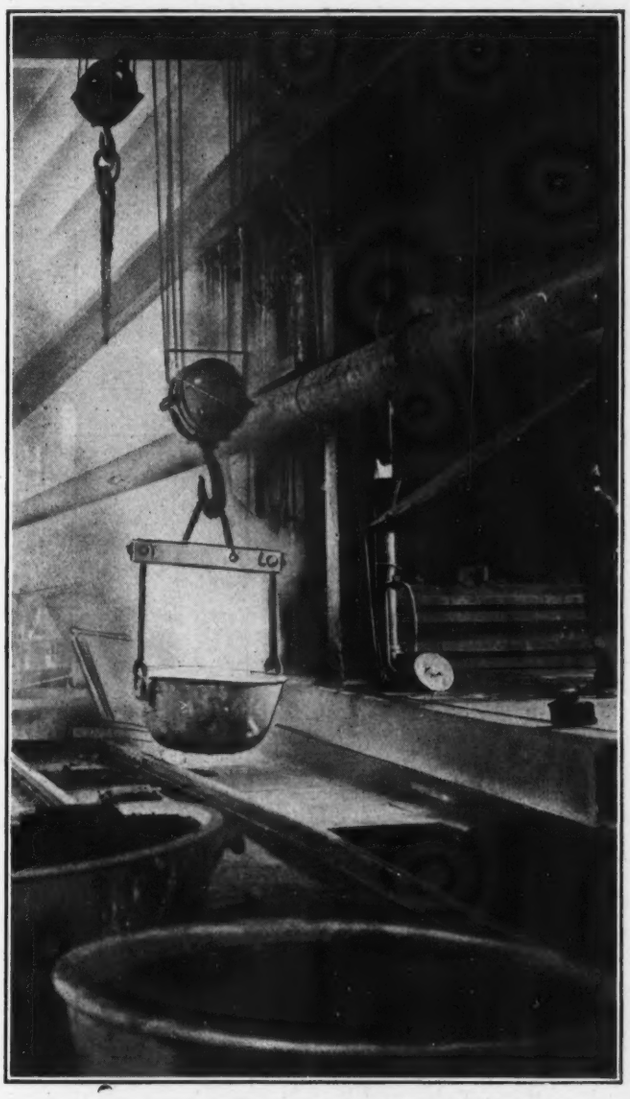


FIG. 7. HANDLING MATTE WITH CRANE

of them, the working space around the furnaces is ample.

The furnace charge carries from 35 to 40% lead, being nearer the higher limit more frequently than the lower, and there is only from 1 to 3% zinc in the charge. This is mixed so as to obtain a slag analyzing 32% FeO, 2 to 4% ZnO, 32 to 33% SiO_2, 16% CaO, and, incidentally, 3% MnO. The slag from the blast furnaces carries 1% lead (by wet assay). Owing to the richness of the charge, and its freedom from zinc and other slag-stiffening elements, from 200 to 250 tons of ore is smelted by each furnace per 24 hours. The matte fall has been 12%, but this will be diminished considerably

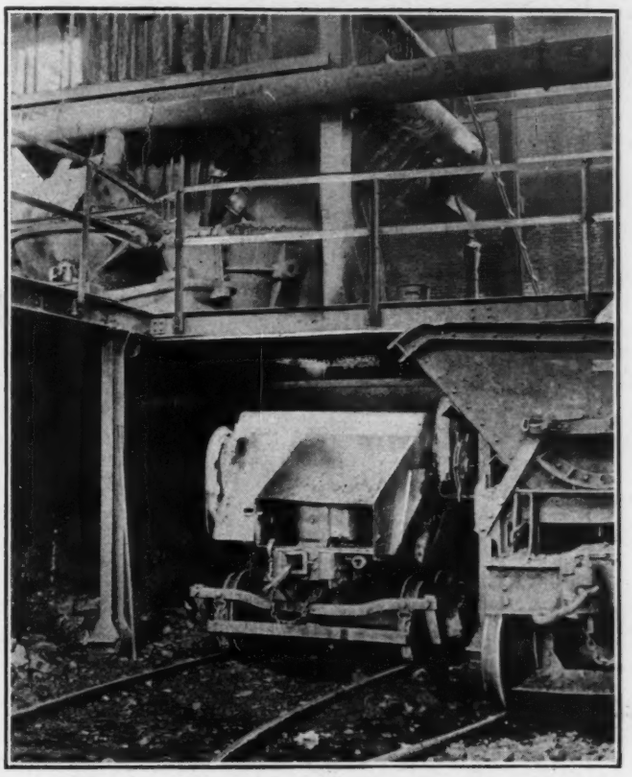


FIG. 8. TAPPING SLAG WITH SLAG CAR

when the ore is given a double roast on the Dwight & Lloyd machines. From 120 to 150 tons of drossed bullion is obtained at present from the two furnaces. Fig. 4 gives a good idea of the layout.

The only details in which the blast-furnace arrangement is to be changed will be to put larger hoods in front and to install a larger draw-off pipe and fan, so as to take the sulphur smoke and fumes away more completely when slag is being tapped or matte drawn. But even without adequate hoods, both the blast-furnace building and the lead refinery are remarkably free from smoke and fume, as may be seen from the accompanying illustrations, which I took in the course of the usual running of the plant. There is a concrete floor both in the blast-furnace building and in the lead refinery.

The Lead Refinery

The lead-refinery building is an extension of the blast-furnace building, the two joining on the side. Consequently, the molten bullion can be taken directly by the traveling electric crane to the drossing kettles of the lead refinery (Figs. 10 and 11), of which there are two (Fig. 12), each having a capacity of 50 tons. In these the lead feed for the softening furnaces is accumulated, and dross is taken off for return to the blast-furnace charge. After this operation, the molten metal is sent by centrifugal pump through pipes to one of two softening furnaces (Fig. 13), having a capacity of 80 tons

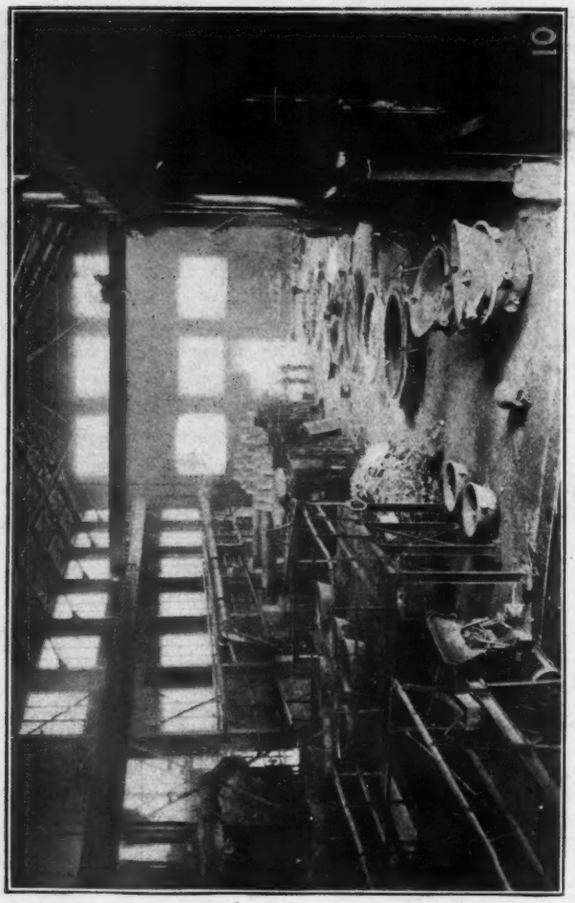


FIG. 10. LOOKING DOWN AISLE TOWARD REFINERY

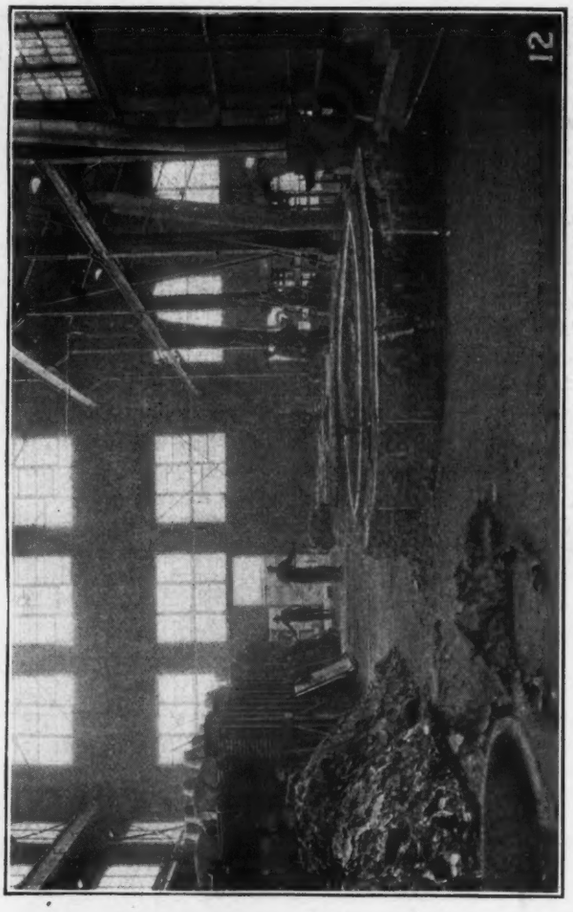


FIG. 12. DROSSING KETTLES, LEAD REFINERY

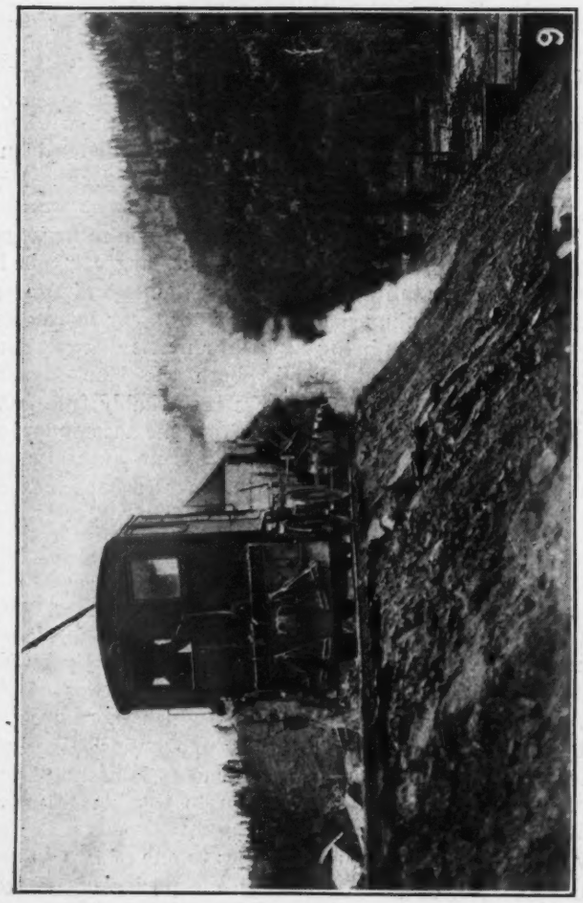


FIG. 9. DUMPING THE SLAG POT

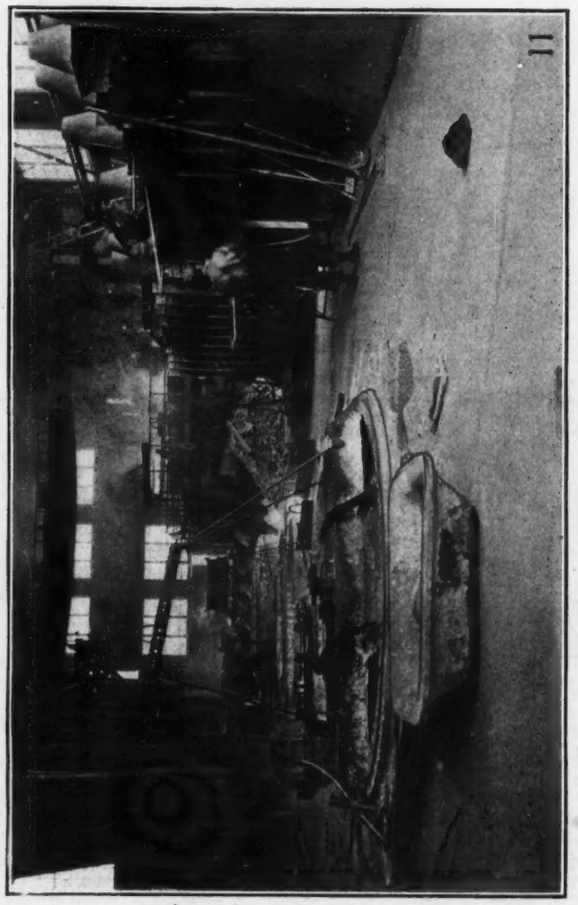


FIG. 11. LOOKING FROM LEAD REFINERY

FIG. 13. SOFTENING FURNACE AND ZINCKING KETTLES

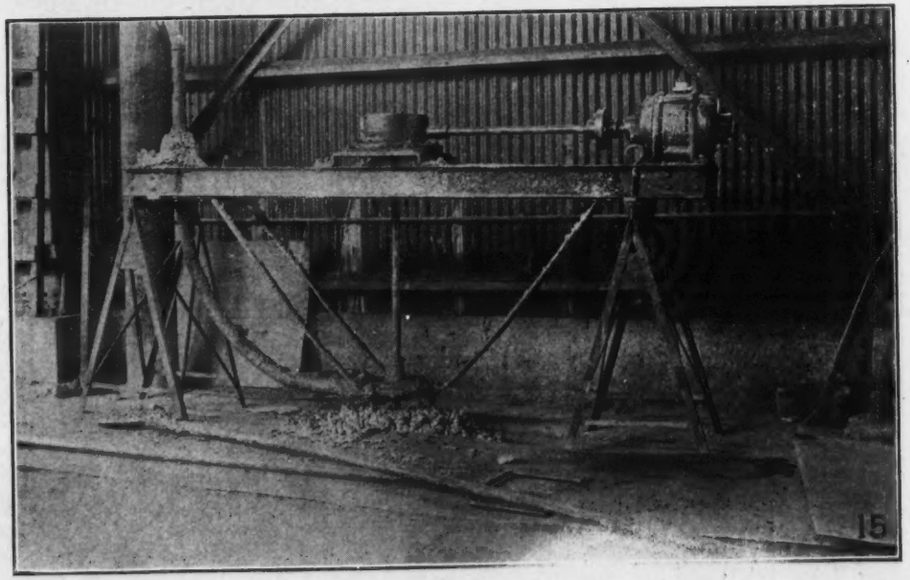


FIG. 15. RUMSEY LEAD PUMP

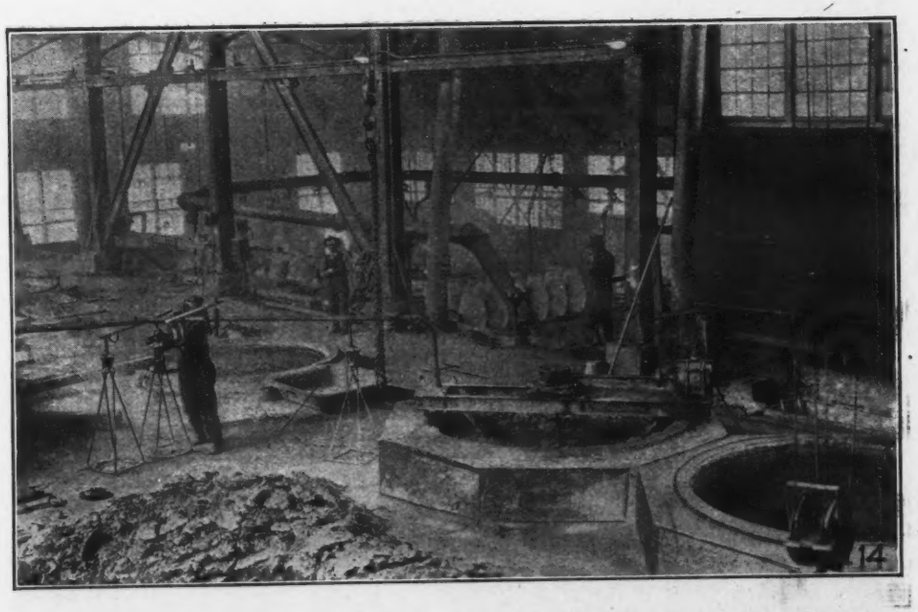


FIG. 14. PUMPING LEAD FROM DROSSING KETTLE

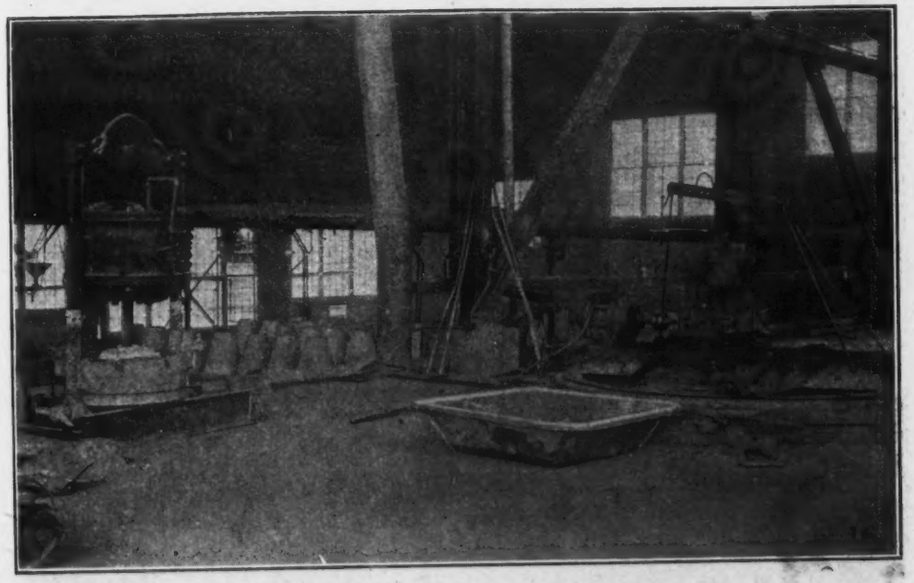


FIG. 16. HOWARD PRESS AND HOWARD MIXER

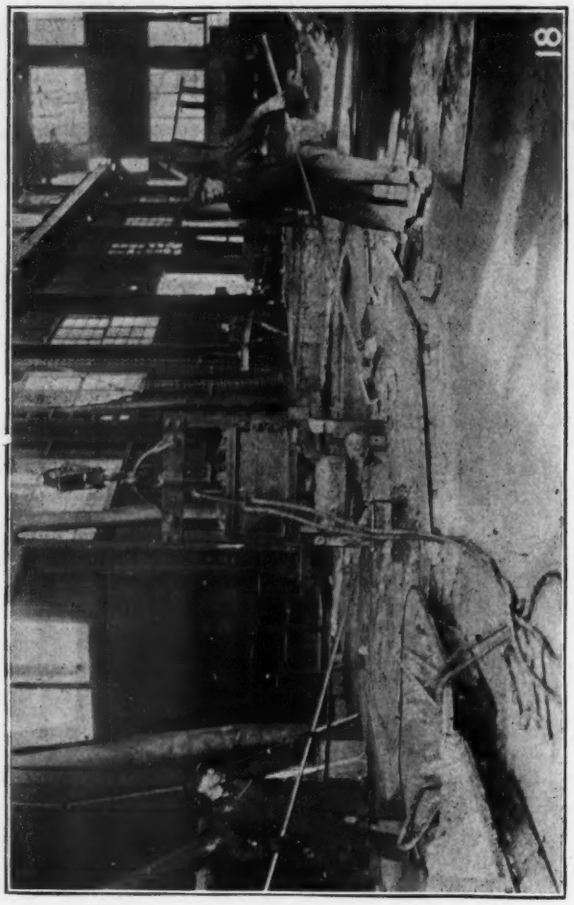


FIG. 18. FIRST SKIMMING OF ZINC DROSS

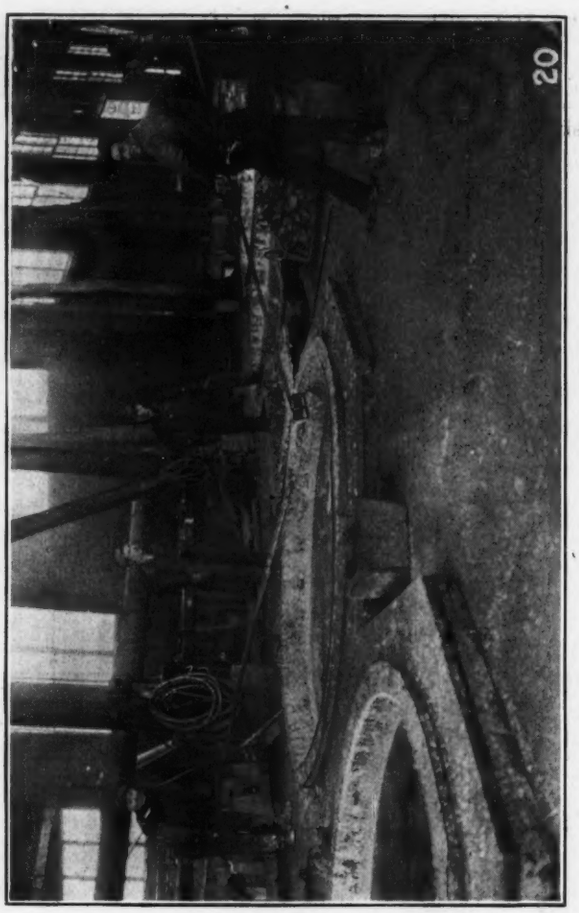


FIG. 20. SECOND SKIMMING OF ZINC DROSS

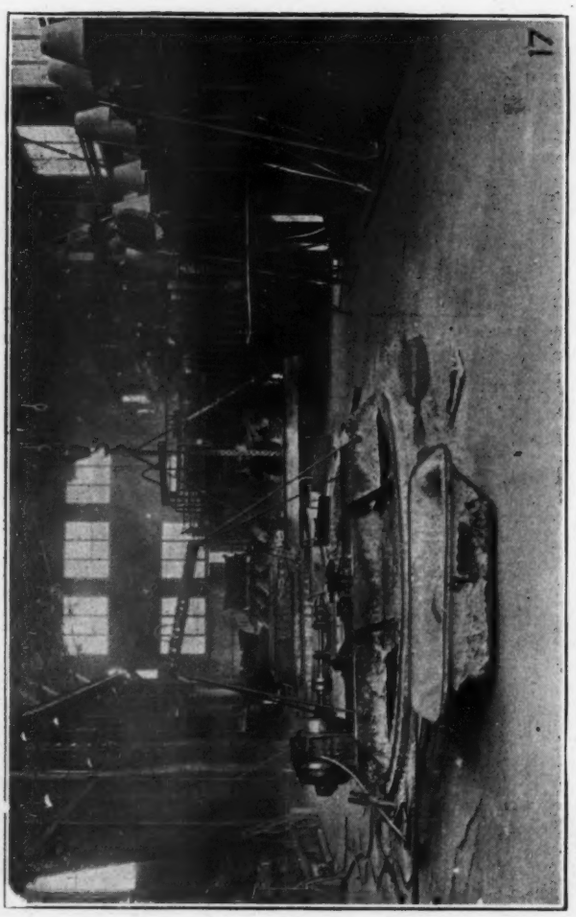


FIG. 17. MIXER IN LEAD REFINERY

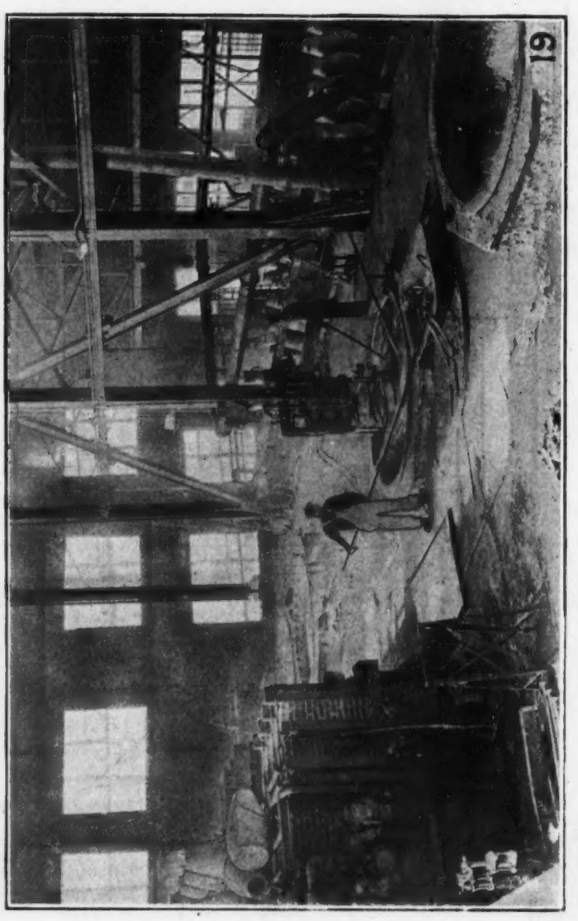


FIG. 19. FIRST SKIMMING OF GREASE

each and fired with powdered coal. One burner that gives a flame from 7 to 8 ft. long is used in each furnace, with an effect similar to oil or producer gas.

Fig. 14 shows the molten bullion being pumped from a drossing kettle to one of the softening furnaces, and Fig. 15 the Rumsey pump that is generally used for this purpose. In addition, a pump specially designed by Bradley, Bruff & Labarthe, and manufactured by the United Iron Works, of Oakland, Calif., is used. Although the driving motors are mounted directly on the frames of these pumps, and are immediately above the molten lead, they do not heat up noticeably, even when the pumps are run continuously for several hours, and the upkeep is not great. It takes about half an hour to empty one of these 50-ton drossing kettles.

A 10-ton traveling crane equipped with a two-motion winch, which has been electrified at the smeltery by mounting a motor on it, so that the horizontal and vertical travel can be regulated by switch cords from the floor of the refinery, is used in moving the pumps, mixers, and press from one kettle to another, and about the

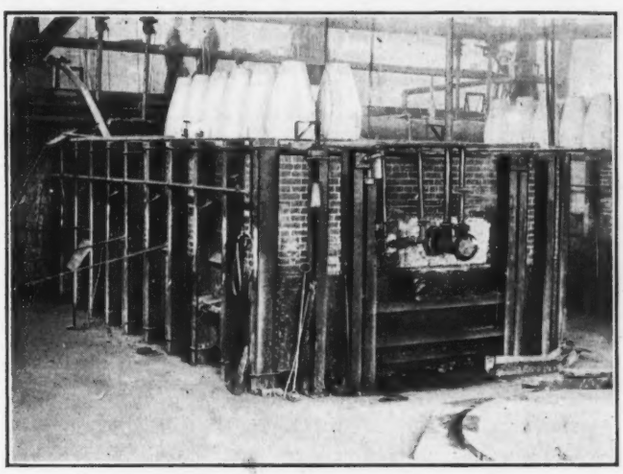


FIG. 21. LEAD-REFINING FURNACES, SHOWING POWDERED-COAL BURNER

refinery. At the softening furnace the molten bullion is raised to a temperature between 1100 and 1200° F., when the antimony begins to rise to the top, and is drossed off, together with some of the lead. This dross carries about 19% antimony and 65% lead. The operation takes from 10 to 24 hours. At present, the dross from the softening furnaces is being held until another furnace is erected for converting it into hard lead.

Parkes Process Used

From the softening furnaces the lead bullion flows by launder to the kettles, where it is treated by the Parkes process of mixing with zinc to collect the gold and silver. The first skim goes to the silver refinery, and the second skim to the next kettle, to supply the zinc for collecting the first skim in refining the next kettle of metal. Thus by using two skimmings a richer zinc dross is obtained for treatment in the silver refinery. The zinc for the second treatment is added in bars of either new or old metal. The first skimmings are squeezed in a Howard press (Fig. 16), and the zinc is mixed with the bullion by means of a motor-driven Howard stirrer (Fig. 17). In Figs. 18 and 19 the first skim is being taken off and squeezed in the Howard press while it hangs over the kettle; in Fig. 20 the second skim is being made.

Faber Du Faur Furnaces

The second skim is accumulated in a steel pan by the side of the kettle to form a cake, but the first skim, after having the excess lead and zinc pressed out of it, is worked around on an iron plate coated with oil to keep the dross from sticking, and cooled into a granular product that can easily be charged into the retorts of the Faber du Faur furnaces in which the zinc is driven off and the lead-silver-gold bullion is left. At present these furnaces are in the silver refinery, but, in order to provide more room, they will soon be set up on the lower floor in the extension of the lead refinery. Owing to the increased amount of lead which is to be made by the blast furnaces, another cupel furnace must be installed at once. At present the retort metal from the Faber du Faur furnaces is cast into bars before going to the cupel furnace, but in the near future this retort metal will be taken in a molten condition directly to the cupels.

The bullion is skimmed until a crust of lead begins to form over the molten metal; then the kettle is heated slightly and the lead pumped to one of the two refining furnaces, each having a capacity of 80 tons (Fig. 21), placed on the lower floor of the lead refinery, together with the merchant kettles and the casting machines.

Each softening furnace is served by two kettles. About one-quarter of the zinc is added in the first treatment and about three-quarters in the second operation of a kettle. It takes about 12 hours to zinc a kettle. Pyrometers are used in measuring the temperatures of the bullion bath during the different steps of refining.

Between 0.5 and 0.6% zinc still remains in the soft lead as it leaves the kettles; so in the refining furnaces the last of the zinc, together with the copper and the trace of antimony which may have come over from the softening furnaces, is drossed off. The two refining furnaces are exactly similar to the softening furnaces, being heated with pulverized coal, and have a capacity of 80 tons each. It takes about 12 hours to remove the last of the antimony, zinc and other impurities which may be in the lead. At present the zinc-lead-antimony-copper dross obtained at the refining furnaces goes back to the blast furnaces for re-treatment; but as soon as the antimony byproduct furnace has been completed, this material, together with that obtained at the softening furnaces, will go to the byproduct furnace for refining.

Superintendent's Accident Insurance

By A. L. H. Street*

Where decedent took out an accident-insurance policy based on occupation as "ore-mine superintendent, supervising only, inside and outside duties," the fact that he had been temporarily employed as timberman for several weeks before he was killed in a snowslide while traveling on a pleasure trip did not invalidate the insurance, holds the Colorado Supreme Court in the recent case of Anderson *vs.* Midland Casualty Co., *172 Pacific Reporter, 1067*, it appearing that decedent intended soon to resume his regular occupation as superintendent.

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Temperature Conditions in Deep Mines

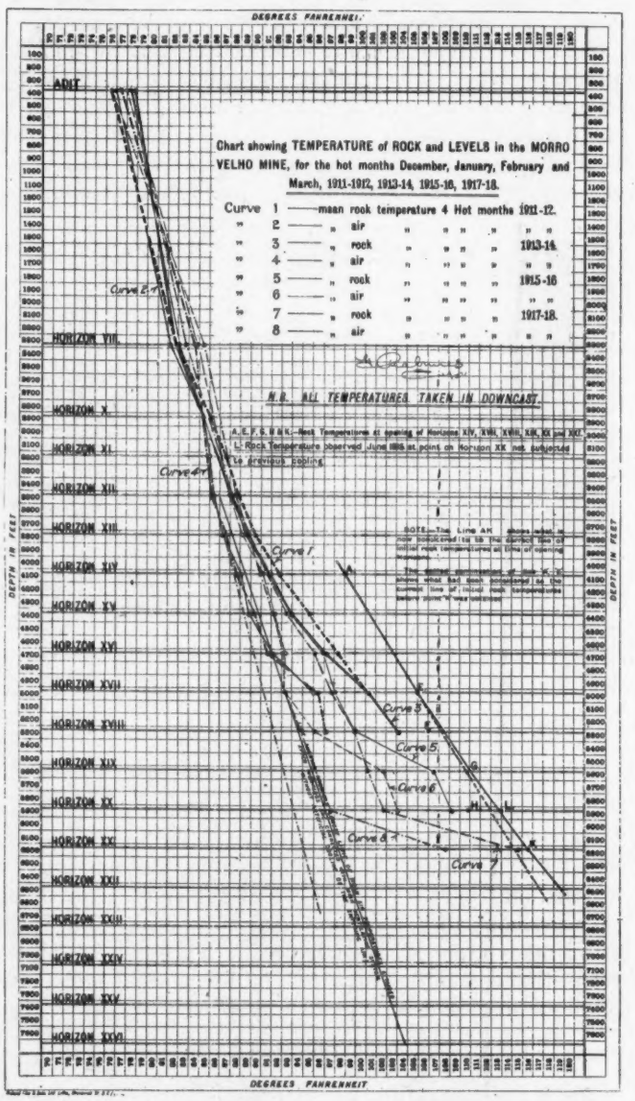
THE 87th annual report of the St. John Del Rey Mining Co. contains interesting data as to the ventilation problem at that company's mine—the deepest and possibly the most notable gold mine in the world. According to the superintendent, G. Chalmers, the usual investigations with reference to rock and air temperatures have been carried out, as in previous years.

By referring to the chart, it will be noted that the most interesting feature, the rock temperature at the time it is opened, represented by the line extending from Horizon 14 to Horizon 21, varies only slightly from the dotted continuation of the line *A E*, which was determined by recording the rock temperature at those two points. The deviation of the solid line from the dotted, showing a little more than one degree over that anticipated, is not a serious increase, and is possibly due to discrepancies in the rock temperature readings at *A* and *E*, arising from local mining conditions at the time the readings were taken; and the irregularities that occur in the other lines representing both rock and air temperatures are probably to be accounted for in the same way. It will be noted, however, that gradual cooling of both rock and air is going on. Nevertheless, in the absence of a cooling plant, it is slow, as will be seen at Horizon 21, where the temperature of the rock in November was 115.7°, and now, six months later, is standing at 114.4°. The highest air temperature so far reported at this horizon has been 109° F., dry bulb. The exceptional heat encountered in the exploratory driving in the lower sections of the mine naturally impairs efficiency; and if miners can get positions at manganese and other mines that are practically on surface they naturally prefer them.

It is uncertain when the cooling plant will be received. In the meantime, the only available means of improving the atmospheric conditions in which the miners have to work is by increasing the volume of circulating air. On Jan. 5 it was possible to remove the 150-hp. motors driving the Sirocco fans, and substitute 200-hp. motors. This brought the speed of the fan up to 415 r.p.m.; and in the fan drift the volume of air circulating was raised to 72,800 cu.ft. per minute —a much higher reading than has hitherto been taken. A distinct benefit has since been noticeable underground. The next addition to air volume will be effected by fans in tandem, driven from the top of the No. 17 winze by one of the 150-hp. motors removed from the Sirocco fans.

The only work which it has been possible to do recently in connection with the cooling plant has been that appertaining to the large building which will be necessary to house the ventilating apparatus. The original designs were discarded, as they called for materials that cannot now be obtained because of the war. Others were substituted, the cost of which has risen enormously. Steel pipes purchased in Brazil have been tried and discarded. An aroeira[1] structure has also been thoroughly considered, and may possibly be finally adopted; but there is a great deal of iron work in the design, as the aroeira at our disposal is not of great lengths or girth, and consequently a large amount of building up to obtain the sizes is unavoidable. Columns of concrete reinforced by old steel rails with timber craneways appear to be the most suitable, despite the fact that cement is now selling at the enormous price of £2 ($10) a barrel. About six miles of old rails will be required for the reinforcing, but fortunately these were purchased locally second hand, and at below pre-war prices.

The plant has increased considerably as regards the general outline arrangement at first contemplated; and


DEGREES FAHRENHEIT.
ADIT
Chart showing TEMPERATURE of ROCK and LEVELS in the MORRO VELHO MINE, for the hot months December, January, February and March, 1911-1912, 1913-14, 1915-16, 1917-18.
Curve 1 —— mean rock temperature 4 Hot months 1911-12.
" 2 —— " air " " " " " "
" 3 —— " rock " " " 1913-14.
" 4 —— " air " " " " " "
" 5 —— " rock " " " 1915-16
" 6 —— " air " " " " " "
" 7 —— " rock " " " 1917-18.
" 8 —— " air " " " " " "
N.B. ALL TEMPERATURES TAKEN IN DOWNCAST.
HORIZON VIII.
HORIZON X.
HORIZON XI.
HORIZON XII.
HORIZON XIII.
HORIZON XIV.
HORIZON XV.
HORIZON XVI.
HORIZON XVII.
HORIZON XVIII.
HORIZON XIX.
HORIZON XX.
HORIZON XXI.
HORIZON XXII.
HORIZON XXIII.
HORIZON XXIV.
HORIZON XXV.
HORIZON XXVI.
DEPTH IN FEET
DEGREES FAHRENHEIT

TEMPERATURE CHART OF NOTED BRAZILIAN GOLD MINE

the estimates of cost have risen correspondingly. The building alone is a large undertaking, under existing circumstances. Originally the intention was to build it at the top of the shafts, but in view of the inevitable delay, owing to transportation difficulties (the plant is now estimated to weigh about 500 tons), it was finally decided to place the structure at the quarry at the adit level; and though this change compelled the driving of a level 800 ft. to the "D" shaft, the economy in time and cost of erection will more than compensate

[1]Aroeira is the name of a Brazilian shrub or tree.

for this, as the tramway system from the central railway and the shops runs to the site.

It will be realized that a month saved in the starting up of this plant will be a matter of great importance if it be possible to reduce to a more reasonable degree the excessive temperature to which the miners in the lower sections are subjected. The study of the chart will enable any one to realize at a glance that the day must come when operations in the mine must cease if the workings cannot be artificially cooled.

Safety Precautions and Results*

Under present conditions, and largely on account of the shortage, inefficiency and migratory character of a proportion of available labor, the prosecution of mine safety work sometimes leads to discouragement. The continuance of the campaign is urgently needed in order:

1. To conserve human life.

2. To conserve man-power. Every accident in which a miner is injured incapacitates him for a certain length of time, possibly permanently. At this time, when men are needed on the fighting front and in the essential industries, it is the patriotic duty of all to make an effort to conserve man-power.

3. To reduce costs. The reduction of injuries to miners must eventually result in a reduction of insurance rates; but it is only by a concerted and sustained effort that this condition can be brought about. It is well known that whenever a miner is killed or injured, the particular work on which he is engaged is more or less demoralized. Frequently much repair work is necessary at the scene of the accident. There is seldom an accident that is not the cause of financial loss to the operator.

Without duplicating what has been written in former safety bulletins, it is desired to direct special attention to the chief causes of accidents in and around mines.

1. Fall of ground. This is the most common cause of mine accidents, and the resulting injuries are usually of a serious nature. The injured man is, in most cases, removed from the ranks of the physically fit, and much suffering is brought to his relatives or dependents. Also, accidents of this kind are costly to the operator. A serious or fatal injury from falling ground usually causes a cessation of work in the place where it occurs. Frequently, accidents of this type demoralize work throughout the whole mine. The prevention of accidents from falls of ground is largely in the hands of the underground bosses. They should be repeatedly cautioned to exercise vigilance, and frequently to warn miners of the necessity of picking down loose rock. The reduction of accidents of this kind will go a long way toward cutting down the total of accidents from all causes.

2. Handling explosives. The careless handling of explosives is the cause of many injuries to miners, and a great loss to the operator. For the prevention of accidents of this kind, careful attention should be directed to the proper making of primers, in order to prevent misfires. Great care should be used in the handling of misfired holes. The danger from misfires is well understood, but it is probable that their cost to the operator is sometimes overlooked. The improper breaking of a round of holes in a drift, crosscut or stope means less rock or ore, possibly a day's work to do over again, and more powder to be used.

3. Falling down open places. Many miners are killed and injured from falls down unprotected raises, chutes and bins. A certain company in Michigan, in studying its accident record, found that a great number of men were being injured from falls. A campaign was at once begun to guard all open places, with the result that the following six months showed a reduction of more than 50% in accidents of this class. It is a simple matter to guard open places, and bosses should be instructed to give close attention to this phase of safety work.

4. Unguarded machinery. The dangers from unguarded machinery are well understood, and certain regulations are prescribed in the mine safety rules. The proper guarding of machinery is largely a matter of common sense. Where a belt or pulley is exposed, it is not difficult to devise a suitable guard for it. Precautions of this kind are imperatively necessary.

*Excerpted from bulletin No. 13, by Edwin Higgins, issued by the California Metal Producers' Association.

Recording Experimental Flotation Tests

BY ARTHUR F. TAGGART*

There has been much loose talking and writing concerning the "mystery of flotation," particularly with regard to so-called "laboratory tricks." This phrase has been used to connote a laboratory flotation experiment incapable of repetition in the mill, or even in the laboratory by any experimenter other than the particular one who reported the original work. Such talk is, of course, utter nonsense. Any man with a scientific or technical education knows that the phenomena of flotation function according to definite, fixed physical laws; and that, if the conditions of any given experiment are repeated, the result previously obtained will be duplicated. The following form was devised to guide investigators in the Hammond laboratory in the performance and recording of flotation test work:

ORIGINAL RECORD OF FLOTATION TEST

Test No.....

Feed:
- Origin.....
- Method of treatment from time of cutting sample until used for test.....
- Approximate mineral composition.....
- Total weight of charge, solids.....gm.
- Assay analysis:

Number	% Cu	% Zn	% Fe	% Insol.

Reagents, Oils:

Name	Laboratory Number	Per Cent.	Sp.gr.	C.c.	Lb. Per Cent
Totals					
Other reagents					

State order of adding.....

Water:
- Source.....
- Litmus reaction.....

Machine:
- Type used.....

Record of manipulation:
- Pre-agitation period
  - Duration.....min.
  - Speed.....r.p.m.
  - Quantity of water added.....c.c.
  - Per cent. solids.....

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Roughing—concentrate period (underline which one):
Duration ..... min.
Speed ..... r.p.m.
Quantity of water added ..... c.c.
Weight of concentrate, wet ..... gm.
Weight of tailing, wet ..... gm.
Weight of untreated material (wet) ..... gm. (Added to cleaner tailing.)
Froth (underline proper descriptive term):
Texture: Even, uneven, coarse, fine
Bubbles:
Size at water line ..... in.
Size at lip line ..... in.
Character: Elastic, effervescent
Quality: Viscous, tender
Mineralization: Heavy, medium, light; gangue, sulphide
Persistence of froth in collection pan:
Thickness of froth layer ..... in. After ..... min.
Thickness of froth in machine ..... min. after
Frothing starts ..... in. (Measure thickness from lip to water line.)
Microscopic examination .....
Litmus reaction .....
Pulp:
Litmus reaction .....
Degree of flocculation .....
Rate of settling in spitzkasten ..... in. per min.
Per cent. solids .....
Note anything remarkable not specified above .....

Cleaning—Middling period (underline which one)
Duration ..... min.
Speed ..... r.p.m.
Quantity of water added ..... c.c.
Weight of concentrate, wet ..... gm.
Weight of tailing, wet ..... gm.
Froth (underline proper descriptive term):
Texture: Even, uneven, coarse, fine
Bubbles:
Size at water line ..... in.
Size at top of froth ..... in.
Character: Effervescent, elastic
Quality: Viscous, tender
Mineralization: Heavy, medium, light; gangue, sulphide
Persistence of froth in collection pan:
Thickness of froth layer after ..... min. ..... in.
Thickness of froth in machine ..... min. after frothing starts ..... in. (Measure distance from lip to water line.)
Microscopic examination: .....
Litmus reaction .....
Pulp:
Litmus reaction .....
Degree of flocculation .....
Rate of settling in spitzkasten ..... in. per min.
Per cent. solids .....

Temperatures:
At beginning ..... Degrees C.
At end of pre-agitation period ..... Degrees C.
At end of rougher period ..... Degrees C.
At end of cleaner period ..... Degrees C.

Metallurgical results:

	Weight of Product, Gm.	% Cu	% Zn	% Fe	% Insol.
Heading					
Tailing					
Concentrate					
Cleaner tailing					
Ratio of concentration					
Per cent. indicated extraction					
Pounds oil per ton					
Pounds ..... per ton					

Remarks .....

Date ..... Calculations by .....
Operator ..... Checked by .....

Experience with several thousand tests has shown that the record furnishes sufficient data for the repetition of any test, with a certainty that the results of that test can be duplicated. I have, further, taken tests so recorded as guides for mill runs and found that proportional quantities under mill conditions gave results which duplicated laboratory indications. This fact seems almost too obvious to dignify by definite statement, but is related here in the hope that it may impress the directors of the many commercial flotation laboratories in the country with the importance of adopting a similar form of record, to the end that their data may be available for their own (and eventually for others') intelligent use, when the memory of the operator is no longer available to supplement the meager record usually made.

Mine Smithy Reverberatory Furnace *

By R. Craib

Owing to scarcity and abnormal cost of materials, considerable attention is being paid to the reverberatory furnace as an adjunct to the smithy, by which means forgings, stems, shoes, dies and similar parts are made from scrap. Most mines have scrap heaps which in pre-war days were looked upon as worthless, but today they have become a valuable asset.

A furnace was installed at the Simmer & Jack Proprietary Mines about four months ago, and its initial operation was accompanied with the usual failures incidental to most new undertakings. An improvement was effected, however, by the addition of forced draft below the fire grate, which is produced by a jet of steam that injects air into a closed ash pit, and that can be regulated to suit any temperature required. The running cost of this furnace is $14 per shift of eight hours, which includes supervision, white and native labor, coal and steam. The following is an account of some of the work which has been accomplished, and which would never have been attempted on the forge, on account of the prohibitive cost:

Battery Shoes

Battery shoes which have had the shanks broken off are heated in the furnace, usually five at a time, and by means of hammer and die are reshanked. Sixteen shoes can be reshanked in this way during the shift, and 152 have been treated in this manner. It is also interesting to know that not one of the shoes so treated has since broken. A novel method in making complete shoes from two old cam bosses and one broken tappet is as follows: The tappet is cut in halves, which provides center plugs for the cam bosses. Each set is then welded, drawn down, and shanked, forming two complete shoes 9 x 10½ in. long. The time in making shoes in this way is 3½ hours each.

Battery Dies

Battery dies are made from five old ones by placing one above the other, welding into a solid mass, and forming under the hammer. One complete die can be turned out per hour by this method. Another method of making dies is by cutting a broken tappet in halves and filling the center holes with worn-out shoes; this forms the material for making two dies. It is found that the life of these dies compares favorably with that of the imported article.

Battery Stems

Battery stems are made by fagoting small pieces of iron—the largest piece being not more than 14 lb. weight—and drawing down to the required diameter. Owing to the hammer serving this furnace being too small, it is impossible to fagot a bloom sufficiently large to form one complete stem; therefore it is necessary to weld short pieces together. One complete stem was made by using the previous bloom as the foundation for the next, and in this manner an unwelded stem was produced at a cost of $35.50. This stem is now working, and apparently it is fully as good as anything ever imported.

*Excerpt from the *Journal* of the Chem., Met. and Min. Soc. of South Africa.

Bushes for battery heads are economically made by means of the furnace, as a great number can be heated at one time. Not only has the furnace been of value to the mill, but it has actually become a necessity to other departments, and all smaller forgings required at the Simmer & Jack properties in future will be made from fagoted iron produced on the property. One complete set of loading box forgings was made from this iron a few weeks ago, which previously had always been made from mild steel, or "Lowmoor" iron, on account of the number of square holes which had to be punched in them. The fagoted iron stood the test of forging splendidly.

Two tons of scrap iron was made into chair plates for 60-lb. rails. This, by the usual method, would have been impracticable on account of cost. The furnace has also been of service in the annealing of skip connections, such as draw-bars, shackles, pins and like accessories, giving the article an even temperature, which cannot be procured by means of the forge.

Boilermakers also welcome the furnace for flanging, dishing and working of plates. A smart piece of work was performed the other day in the dishing of a ⅜-in. plate to form the rose of an 8-in. foot valve. The job was completed in five hours, though in the ordinary way it would have taken three days. Sixty pieces of 1-16-in. plate, 14 in. in diameter, were flanged to a depth of 1 in. by means of furnace, die and hammer in five hours.

The fagoting of wire ropes has not been as successful as was anticipated. on account of slight flaws in the apparently solid bloom, and this also applies to the fagoting of broken jumper steel. A few of the Jackhamer pistons which have been made from these blooms, however, show that in all other respects this would be splendid steel for the purpose. Probably when production in quantity is required. a remedy will be found to overcome this difficulty.

Substitute for Corrugated Iron *

Efforts to practice economy in the use of steel and iron have resulted in the production of a satisfactory substitute for corrugated iron and sheets. It is an asbestos-cement roofing material. During the last year a large plant has been built in England for manufacturing this product. The method of making it is as follows: After being finely ground and freed from extraneous matter, the asbestos, which acts as the reinforcing agent, is mixed with portland cement in the proportion of about 1 to 6, and made into a paste with water. This paste is then taken to a machine of the paper-making type, where, on a large revolving drum, it is formed into sheets or felts. After the sheets have been trimmed to size, the corrugations are impressed on them. The important condition for this operation is to insure that the tops of the corrugations are as strong as the other parts of the sheets. Finally, the sheets are subjected to a "seasoning" process. The corrugations are made to the 3-in. pitch which is usual with corrugated iron sheeting, not to the 2½-in. foreign pitch, and they can therefore readily be used to repair roofs of corrugated iron. One of the chief advantages claimed for the material is its durability and resistance to climatic conditions, especially to an acid-laden atmosphere, which rapidly destroys corrugated iron. The sheets are also fireproof and are poor conductors of heat.

*Abstracted from the *South African Mining and Engineering Record.*

Jus' Minin'

By D. E. Charlton

Now, pardner, it 'ardly seems fittin',
  W'en tha 'ole bloody worl's upside down,
For me an' you 'ere to be sittin'
  An' cursin' at each bloody roun'.
Coorse now I ain't sayin' nothin'
  Bout 'ow cost of things 'as gone 'igh,
For, damme, m'son, there's no bluffin',
  As to wot a man's pay check will buy.
W'en they talk of the 'igh cost of livin',
  We'll h'agree that tha h'argument's true,
But tha wages is 'igher they're givin'
  So tha h'old's just tha same as tha new.

My feyther, in ol' days in Cornwall,
  'E'd perch me on top of 'is knee
And tell that a gert bloody mud ball
  Never gathers no moss if it be
That its pitchin' and rollin' and tumblin'.
  So tha same 'olds as true for us both;
If we start h'out a-grumblin' and stumblin',
  To once settle down we'll be loath.

I naws that they're payin' gert wages
  In tha shipyards and places like they,
But, damme, tha right sort of stages
  Is 'ere; and it's 'ere that we stay.

'Tis minin', m'son, that we're doin',
  So why should thee bother your 'ead,
W'en we naws that tha shif' boss is stewin'
  For 'twas only today that 'e said:
"Boys," says 'e, as we piled on tha cages,
  "We mus' cut out tha 'five' on tha shif',
"For thee naws that tha conflic' that rages
  "Will not cease 'til they've driven a drif'
"Clean through, an' they've mucked up tha Kaiser
  "An' the rest of 'is 'ideous crew.
"I'm dependin' that thee'll answer 'Aye, sir,'
  "W'en tha fussin' and fightin' is through.
"For each bloody one 'as a duty
  "Jus' tha same as a fightin' man now,
"An' copper these days is some beauty
  "For it's 'ammerin' Fritz in tha row."

So 'and me that there bloody drill bit,
  An' turn on tha h'air good an' strong,
An' we'll sen' all tha 'uns to tha 'ell-pit
  If it's copper they wants. Gos' along.

Natural Grecian Cement

The volcanic island of Santorini, in the Ægean Sea, produces a natural cement called Portselana, which, mixed in certain proportions with lime and sand, is an excellent substitute for the best cement, states a consular report. Portselana has been used for many centuries and is still being utilized throughout the Near East in the construction of bridges, harbor works, breakwaters, forts, lighthouses, and similar structures, in the Mediterranean, the Black Sea, and the Adriatic. With it the Venetians constructed the great fort of Monemvasia and Nauplia, the then Gibraltar of the eastern Mediterranean, the foundations of which are in the sea, intact and immovable now after many centuries. The forts of Crete and those of the Dardanelles are also built with Portselana.

Correspondence and Discussion

Labor Trouble in Reduction Works

In the Oct. 12 issue of the *Journal* there appeared an article, by Paul T. Bruhl, which had for its purpose the improvement of the morale of an essential group of workers in the metal-mining industry—the milling crew. As an attempt to raise the efficiency of operations by increasing the *camaraderie* that may in isolated instances exist, or to bring such a spirit into being in the majority of cases, the paper was welcome; and it will doubtless give rise to expressions of opinion from some who may view the question from another standpoint, as well as from those who may be in agreement with the sentiments advanced.

The contributor expresses the opinion that an apparent lack of enthusiasm among the reduction-works staff may be remedied to some extent by making things easier for the millmen—by improving the conditions of those who receive orders from the shift bosses. Metallurgical nomenclature is in a state of uncertainty at all times, and is governed by no generally accepted law. The use of the term "millman" is arbitrary, and, in this instance, apparently refers to those who may enter as unskilled helpers, and may become, under the direction of the shift bosses, competent workmen.

With inexplicable solicitude this body of helpers is singled out for special consideration. No objection will be made to the contention that their pay, if only a living wage, must be increased; but it is doubtful that there will be unanimous agreement with the sentiment that waning enthusiasm, arising from conditions which must often be patiently borne by many other classes of educated and trained men in positions of responsibility, must be stimulated with bonuses. Such a suggestion presents points of similarity to the practice of prescribing habit-forming drugs, where dosage is subsequently increased (at the sole desire of the patient) to an almost unbelievable point, and the net result is usually nil or even negative.

Millmen, it is averred, have no stake in the welfare of the concern. In the majority of instances neither have their bosses, nor their bosses' bosses, for that matter; and no particular reason is evident why they should be singled out for special consideration. The shift bosses above them, the roustabouts below them, are equally worthy of attention; and any scheme of profit-sharing should be mutual and comprehensive, and should include all the employees—those working in the humblest capacity as well as those who are carrying out their duties in executive positions under binding legal agreements.

Reference is made to the constant shifting from job to job on the part of the millman; but this fact must indicate irresponsibility as well as individual independence, even if discontent is justified. What other class of men in a mill are able to flit from camp to camp, earning sufficient at intervals to live during the periods of leisure that intervene—who are carefree enough to let the morrow take care of itself? What other reduction-plant worker can be certain to find employment with equal facility? Among the superintendent class, such improvidence would be impossible, or, if indulged in, would lead to financial ruin and professional suicide. Even foremen are usually too dependent on their wages to risk unemployment, and seldom leave their positions unless for sound reasons.

The question is open for discussion, but it is doubtful if any permanent good can result from the practice of subsidizing a favored section of workers whose preparatory training, in order to obtain what is generally conceded is a satisfactory and adequate wage, is usually negligible, and whose personal effort and expenditure in this connection are seldom conspicuous.

In those instances where extra payments on account of improved results are justified, it is certainly reasonable to insist that prizes given shall extend to all concerned. Too often has the absurdity occurred, in mill work, of unskilled men receiving bonuses for higher output or better returns which have arisen almost entirely as a result of the untiring efforts and self-acquired mental and technical efficiency of the mill superintendent or his immediate subordinates, who, being salaried officials, may, according to the rule with many companies, receive no share. Under such conditions the trained man in the responsible position has everything to lose and nothing to gain. The unskilled worker's position is the reverse.

As a class, technically trained and experienced plant superintendents and their assistants are equally deserving of better treatment and of remuneration more in keeping with their responsibilities. A considerable advance in the average emoluments will be necessary to place the mill superintendent in a position as comparatively independent of worry and anxiety over financial matters and the uncertainties of the future as is the millman of today at his present rate of wages.

Morale can be improved by a radical increase in the loyalty of employees toward their bosses, as well as by improving the working and living conditions of all classes. Additional and frequent grants of money and bonuses to those who care nothing for the risk of immediate dismissal and who can growl with impunity because they are free of responsibilities, will act only as a temporary soporific which must inevitably lead to ultimate if not immediate dissatisfaction. If the element of personal loyalty is not present among all grades of the mill crew, it is absurd to talk about *esprit de corps*, for the men do not realize the meaning of that or any equivalent phrase.

An example of the amazing offers made to technical men looking for positions of responsibility in milling plants is given in the current Bulletin of the A. I. M. E. A mill superintendent is required for an African development company. He must be experienced in

modern metallurgical practice, presumably of copper, and a capable manager of native and other labor.

The aspiring applicant is expected to find the money and take all the risks of a voyage to Africa and a long railway journey to the mine, as there are no deposits near the coast. Delays in times like the present are inevitable, but the company will lose nothing by this, as it is stipulated that salary will begin on the day of arrival. If the applicant is a married man, he will receive about $600 when he gets to Africa, to go toward a reëstablishment of his finances, this sum being provided to compensate for all expenses incurred. He will be allotted an unfurnished room or house at the mine at which he and his family can camp, and where such elementary comforts as free light, water, and sanitary service will be provided. His salary will be about $300 a month, and the company will make a six-months' contract with him, at the termination of which he can or must return to his home at his own expense.

The absurdity of the whole proposition makes the appeal laughable, but it affords an insight into the attitude of too many mining companies toward men of technical training and experience that they are anxious to obtain, whom they would entrust with positions of the highest responsibility, and from whom they expect loyal support and unceasing effort.

It is to be hoped that, when fairness is being dealt out to the milling crew, the superintendent and his associates will not be forgotten. "TECHNICIAN."

New York, Oct. 20, 1918.

Enticing Labor Away From Work

The papers this morning contain display advertisements inserted by the U. S. Employment Service, of free excursions, free transportation and free meals. On the front of the Government Employment office there is a big placard reading "Free Excursion to Nitro Today."

In other words, in the effort to recruit labor for the shipyards and munition plants, the Employment Service is playing on the love of excitement and adventure of the people; and by so doing encouraging the tendency to wander from job to job, which is destroying the efficiency of workers throughout the country. This in a state where a large proportion of the mines are threatened with the necessity of closing down, on account of the shortage and inefficiency of labor.

It may be that labor is needed even more urgently for the nitro plants than for the mines, and it is conceivable that it might become necessary to close down some of the latter. But it is inconceivable that either munition plants or mineral production will be benefited by a policy which encourages men to drift from West to East and back again, or from one mine to the next, spending two-thirds of their time in "free excursions."

It is not so much a question or hours, wages, or conditions of work, as the desire for novelty, that induces the laborer to change from one place to another. He is being educated, by this mistaken policy, to drift from job to job, at the expense of the Government or of private employers. I know of no greater danger confronting this country today. Our armies can beat the Huns, but this condition threatens to beat America.

Denver, Colo., Oct. 10, 1918. X.

The Iron Ore of Brazil

The summary of E. C. Harder's remarks on the Brazilian iron-ore situation published in the *Journal* of June 1, 1918, contains some statements and inferences not justified by the facts. First and most important of all, the iron-ore district mentioned by Mr. Harder refers only to that field at present the most accessible. Its ore content aggregates about 3½ billion tons, and the deposits extend along the Central R.R. around Congonhas, Burnier, Bello Horizonte, Ouro Preto, Caraça, Sabara and Santa Barbara. These cities are all served by the Central R.R., whose traffic capacity is estimated at about 2,000,000 tons annually. Manganese ores are being transported from this same district by this railway at the rate of 55,000 to 60,000 tons *monthly*, and such traffic could be doubled, as night trains are run, as yet, on only one section.

The deposits bought by foreign concerns are situated around Itabira do Matto Dentro, 80 miles from Ouro Preto, the center of the deposit referred to, and an authority in this matter has said that they will furnish ores for 50 times 50 hundred years. But the Victoria à Minas Ry. is a narrow-gage, single-track, badly constructed road, totally unable to take such traffic at normal rates, or even the transportation of cereals, metal pigs and hardwood logs. Its last station is now 100 miles from Itabira. Neither could Victoria harbor accommodate the necessary fleet for the transportation of ores.

The future double-track broad-gage electrically operated railway will go to Santa Cruz harbor, near the mouth of the Rio Doce. The state government, it is said, desirous of developing commercial activity at the capital, Victoria, asked the Federal government for the concession of Santa Cruz harbor, to facilitate the exportation of iron ores, as no plans had been made by the Federal officials for developing that fairway.

So things stand. Everything points to the fact that, in order to build the railroad and the harbor, a large expenditure of money will be required, moderate estimates of which run to $60,000,000. Of course this same railway, by means of branch roads extending 40 to 80 miles on either side, will tap other and equally important iron-ore fields. The Federal government recently signed a decree providing for the construction of branch railways to the mines, and for the issue of a loan at 5% for 12 years, provided adequate samples of the ore are submitted to the government and the project is approved as warranting the expenditure involved. The extensive coal fields in southern Brazil are now being explored with the support of the Federal government, and it is probable that coke will be available.

As to the mineral resources of Brazil, they are incalculable. This will be readily comprehended if it be considered that Brazil equals continental United States in area, though practically unsurveyed. The great authority on Brazilian mineral resources is Baron Eschwege, who went through the country in 1812! The ascertainable facts lead to the conclusion that, as regards iron ores, three districts at least are of equal value and importance to the field—in Itabira do Matto Dentro—in western Minas Geraes, Goyaz and Matto Grosso.

E. JACY MONTEIRO.

Riacho das Vares, Minas Geraes, Brazil, Aug. 14, 1918.

A Suggestion to Mining Companies

While I was in Denver, I went to hear L. H. Knight, a member of the Foreign Legion of France, deliver an address at the members' council of the Denver Civic and Commercial Association. Knight is no orator, but he is an inspiring and effective speaker after he gets warmed up and forgets himself and lives again through his experiences. I believe that he is most effective in making his hearers realize how much the soldier over there depends upon the worker over here. Mr. Knight is a graduate of Princeton, an ordained minister, but a man who believes in killing Germans as fast as he can, and who is proud that he has killed several. He does not seem to be a fighter, but when he gets started he makes his hearers realize what war is.

Knight says: "Ah, my friends, it is the shoulder of the next man up even with yours that gives you the courage over there when going under fire, but I wonder how many of you really understand how much the fire and vim of the soldier over there are kept up between fights by the knowledge that you over here have got your shoulder also up against his, backing him up with all your power. I wonder if you workers realize as you should how important it is for you over here to work shoulder to shoulder six days of the week to keep us over there fighting shoulder to shoulder."

If the copper and lead operators would get Knight, and a few others like him who have gone through the mill over there, to tour the mining camps and speak to the workers at the mines, I am confident that inside of two months of such campaigning (having about five speakers follow each other up in the course of two weeks, to establish the viewpoint and maintain it long enough so that it sinks home) the number of men who do not work six days a week will be cut 75 per cent.

Cripple Creek, Colo., Oct. 1, 1918. C. T. R.

The Ford Mine Locomotive

My attention has been called by the California Mine-Inspection Service to an article which appears on page 223, of this volume of the *Journal*, describing the Ford mine locomotive. The Mine Inspection Service states that "this kind of thing is causing considerable trouble because it makes mine operators want to install gasoline engines underground." The operators cannot seem to realize how much of an air current is required for this installation.

As you may know, there have been numerous deaths caused by the use of gasoline locomotives and engines underground, on account of the exhaust containing large amounts of carbon monoxide. To use such locomotives safely requires a very strong current of air, and the gravest difficulty appears to be that, when there is such a strong current of air in the main road, owing to mechanical ability of the locomotive to be used in side tunnels and chambers where there may be little or no movement of air, it happens at certain times that locomotives are misused, endangering the life of the locomotive engineer and the men who may be working in such places.

In many of the progressive states the use of gasoline locomotives has been forbidden in coal mines by the state inspection departments. The minimum quantities of ventilating currents which will dilute the exhaust gases of engines of this kind are given in Bull. 74, entitled, "Gasoline Mine Locomotives in Relation to Safety and Health."

I am bringing this to your attention, as I know you feel the *Journal* has certain responsibilities to the mining public. GEO. S. RICE,

Chief Mining Engineer, U. S. Bureau of Mines.

Washington, D. C., Sept. 24, 1918.

[We agree with all that Mr. Rice has said in the above communication. In Bull. 75 of the U. S. Bureau of Mines, "Rules and Regulations for Metal Mines," the greatest caution in the use of gasoline underground is advised, and the employment of gasoline locomotives is deprecated. However, gasoline locomotives may be used safely and advantageously on the surface of mines. The article that inspired Mr. Rice's comment did not sufficiently distinguish between these uses.—EDITOR.]

Suggestions to the Editor

I wish you would put just a few funny pictures in the *Journal* and a few more real good stories so as to sort of camouflage (I think that is the proper word) some of the real good advice that you are offering to the boys.

When I come into the reading room of an evening, *Life*, *Judge*, *Saturday Evening Post*, and the rest of them are all being read, while the *Journal* is often waiting for two or three of us who have found some pretty good things in it.

Just as sure as one of the boys does read it, you can count on hearing him get off something sensible next day, either quoting you, or giving it as an original idea.

When the boys see *Engineering and Mining Journal* they just naturally think: "There's that high-brow paper" and are sort of ashamed to be seen reading it.

You offer us some mighty good pills occasionally, but lots of us miss them altogether. Now if you would only sugar-coat them with more of those Cousin Jack stories and a few cartoons, and Berton Braley's live-wire poems, the pills would be swallowed by the very boys who need them and the *Journal* would be doing more of the good that it is intended for.

Please tell the boys in your next why they should be saving more of the high wages they are getting today rather than spending it like drunken sailors, and oblige, A MINER.

Tonopah, Nev., Oct. 15, 1918.

Assay Practice Economies

In addition to the assay economies given on page 584 of the *Journal* for Sept. 28, I would direct attention to the practice of H. L. Glenn, of the Seattle office of the mint service, who saves up his parting acid during the busy season, and, when work is slack, very carefully precipitates the silver with hydrochloric acid, being absolutely sure that a slight excess of silver remains in the acid. The gravity of the acid is then adjusted and the chloride of silver allowed to settle, when the acid is ready for use again.

FREDERIC P. DEWEY,
Assayer, Bureau of the Mint.

Washington, D. C., Oct. 8, 1918.

Events and Economics of the War

The rapid retirement of the German right wing in Belgium followed closely upon the capture of Roulers, reported last week, and the Belgian coast was quickly cleared of the enemy. The German retreat progresses, with the Allies approaching Ghent. Lille, in France, and Douai were evacuated, the foe's lines holding further south. Grand Pré, north of Argonne Forest, was taken by American troops.

Stories of turmoil continue to come out of Austria-Hungary. The Magyar kingdom is said to have proclaimed itself independent and the Czechs to have seized Prague, the capital of Bohemia. Vienna's bid for peace was received at Washington and answered, this Government declining to enter into negotiations. Berlin's third note to the President, seeking an armistice, arrived on Oct. 21. Germany is reported to have ceded 21,000 tons of ships to Spain, to compensate for U-boat sinkings. In the Balkans, the reoccupation by the Serbs of their native land continues; the French have reached the Danube, 60 miles from the border of Hungary; Durazzo, recently bombarded by the Allied fleets, was captured by the Italians.

In the United States, all efforts were concentrated during the week on the final drive for the Fourth Liberty Loan, which is said to have been oversubscribed, though the total has not yet been determined. The war and excess-profits section of the War Revenue Bill was re-written by the Senate Finance Committee. Secretary Daniels asked $600,000,000 for new warships. The ban on the use of gasoline on Sundays in the East was removed by the Fuel Administration.

Lens Region Much Damaged

With our knowledge of German methods, it was to be expected that nothing would have been left undone to render the coal region about Lens of as little value as possible to the Allies, when the recapture of what was one of France's main sources of coal supply was seen to be inevitable. From Paris word now comes that it will be from eighteen months to two years before any coal can be taken from the mines in the devastated area, owing to the damage done by the enemy before his retirement. After an examination of the properties, it has been estimated that five years will be required to restore the normal production of the pits.

The inspection was made, according to the dispatch, by Albert Lebrun, the Minister of Blockade, and Louis Loucheur, the Minister of Munitions, together with M. Perier and M. Basly, chairman and vice-chairman, respectively, of the Committee on Mines of the Chamber of Deputies. They visited Lens itself and the adjoining mining towns of Sallaumines and Lievin. They found the mines flooded in these localities, and although every posible measure to restore the operating plants has been taken by the state, it will be two years, it is estimated, before the mines can be cleared of water. The mining plants have been systematically destroyed, the destructive process having been carried to the limit.

At Courrières, northeast of Lens, the Germans had blown up the mines before retiring. Of the 10,000 houses in Lens the visitors found not one left standing, the town having been completely razed.

Steel Situation Improved

Improvement in the steel situation is shown by a survey just completed for J. Leonard Replogle, director of steel supply of the War Industries Board, but in disclosing this condition on Oct. 16, officials of the board said production was still far behind war demands and the outlook for supplies for non-war industries for the remainder of the war was not bright.

Pig iron is now being produced in the United States at the rate of more than 42,000,000 tons a year, and steel plates at the rate of nearly 6,000,000 tons, both records in the industry. The plate production is more than 40,000 tons a week greater than ever before. Production of all steel is running at the rate of only approximately 33,000,000 tons a year, however, and the demands of the Government and the Allies are at the rate of about 50,000,000 tons.

Daylight Saving Extension Fails

No further effort will be made by Congress to continue the existing Daylight-Saving Law, and the hands of the clocks will be turned back an hour on Oct. 27, as planned originally. This decision was reached after a conference between Congressional leaders and Chairman Baruch of the War Industries Board, who had recommended that the law remain in force for the period of the war.

The Senate passed a bill recently to continue the law in effect indefinitely, as announced in the last issue, and it is now pending in the House. Senator Calder, of New York, author of the original daylight bill, said after the conference that difficulties of the Railroad Administration and other Governmental agencies in arranging schedules and anticipated difficulties in getting final action on the bill by the House contributed to the decision not to continue the existing regulation. The War Industries Board had urged continuation of the law because of its value in saving fuel.

Reconstruction Plans Made

The creation of a Federal commission on reconstruction is proposed in a bill recently introduced by Senator Overman, chairman of the Judiciary Committee. The bill provides for the appointment of five commissioners by the President, at $10,000 a year, not more than three of whom shall be members of the same political party. This body will choose a chairman from its own membership. It will cease to exist two years after the termination of the war unless Congress otherwise provides.

The duties of the commission will be to examine into the problems and conditions arising out of the war and that may arise during the period of transition from war to peace in the National economic, industrial and social life. It is to recommend to Congress legislation necessary to meet such problems before their solution is actually forced upon the Government. The commission will also be required to investigate and report on any such question referred to it by either house or by the President. It is particularly provided in the bill that it shall investigate and report on the following:

(a) The financing, regulation, control, and development of the merchant marine.

(b) The development, regulation, expansion, and direction of foreign trade.

(c) The reorganization, financing, and readjustment of industries engaged in war work, by way of reconverting them to normal production.

(d) Technical education and industrial research as a means of developing and strengthening of industry.

(e) The redistribution and employment of labor in agricultural and industrial pursuits, and the problems of labor growing out of demobilization.

(f) The supply, distribution, and availability of raw materials and foodstuffs.

(g) The conservation and development of national resources.

(h) Inland transportation by rail and water.

(i) Communication by telephone, telegraph, and wireless.

(j) The reorganization of Government departments, bureaus, commissions, or offices, with a view to putting the Government on an economical and efficient peace basis.

(k) The consolidation of such acts and parts of acts of Congress which relate to the same subject matter, but which now appear at various places in the statutes.

An appropriation of $500,000 is provided for in the bill to carry out its provisions.

A pamphlet entitled "Economic Reconstruction, With Analysis of Main Tendencies in the Principal Belligerent Countries of Europe," has just been issued by the Government, through the Bureau of Foreign and Domestic Commerce. At the outset, this report states that in all belligerent countries there seems to be a unanimous opinion that the war will bring about a great extension in Government control of, or participation in, trade and industry. This is true, it holds, even in circles where such extension is deemed harmful.

More Labor for Gold Mines

SAN FRANCISCO CORRESPONDENCE

Protection of metal and non-metal mines, in respect to high costs of mining, may possibly be better served by the U. S. Bureau of Mines in its efforts toward the conservation of man-power than by all the propaganda literature sent out by the American Gold Conference. The high cost of labor is a large factor in the excessive total cost of gold mining. If this evil can be cured, the others can be more easily overcome.

The position of the Bureau of Mines may preclude its action in the interests of any one branch of the metal-mining industry; but its efforts in behalf of the labor of both the metal and non-metal mines cannot fail to be of benefit to the gold mines. The action taken by Director Manning resulted from a conference of the Bureau officials and those of the American Institute of Mining Engineers and the American Mining Congress, and is based directly on the approval of the formal organization effected by this conference, which is composed of advisory boards which will assist in securing deferred classification of miners and furloughs for miners who have been drafted.

The boards will be guided by the coöperative action of George J. Salmon, chairman of the labor committee of the Bureau, and of J. Edward Spurr, chairman of the man-power conservation committee. Advisory boards have been appointed in the several mining states of the West as well as in the Middle and Southern states. In California and other Pacific Coast states these appointments are as follows: California—Edwin Higgins, chairman, 625 Market St., San Francisco; P. C. Knapp, district representative, San Francisco; N. S. Kelsey, Jackson; T. E. Graff, Redding. Washington—Conrad Wolfle, chairman, 217 Symons Building, Spokane; W. R. Rust, Tacoma; George S. Bailey, Republic; George Turner, Spokane; W. J. C. Wakeford, Spokane. Arizona—L. D. Ricketts, chairman, Warren; Joseph P. Hodgson, Bisbee; B. Britton Gottsberger, Miami; Robert E. Tally, Jerome. Utah—Walter Fitch, chairman, 304 Boston Building, Salt Lake; John M. Hayes and G. W. Lambourne, Salt Lake. Idaho—Frederick Burbidge, chairman, Wallace.

Engineers Wanted

The Construction Division of the Army needs 50 chiefs of survey party; 50 transitmen; 25 levelmen; 125 rodmen; 150 chainmen, and 50 topographic draftsmen. These positions are open to men only, except the drafting positions, which are open to both men and women. All of the positions are in the civil, not the military, service.

Persons interested should apply to the U. S. Civil Service Commission, Washington, D. C., or to the secretary of the local board of civil service examiners at Boston, New York, Philadelphia, Atlanta, Cincinnati, Chicago, St. Paul, St. Louis, New Orleans, Seattle or San Francisco. The examination will be of the "non-assembled" type; that is, the ratings will be based upon education, training, experience and physical ability as shown by the applications and corroborative evidence.

Graphite Restrictions Modified

Restrictions on the importation of graphite have been modified by the War Trade Board in the following order:

No licenses for the importation of amorphous graphite (plumbago) shall be issued hereafter, except such shipments as are of Canadian origin and come overland or by lake from Canada, or of Mexican origin and come overland from Mexico.

Licenses may be issued for the importation of graphite of crucible grade when the applications therefor are otherwise in order, and where the chemical section of the War Industries Board has approved the issuance of said license, and has certified that the ultimate consumers of the said graphite have been using at least 20% of domestic or Canadian flake graphite in the manufacture of their products.

British Attack Gold Problem

There is a more optimistic feeling among gold-mining interests, according to a dispatch from London, owing to the appointment of a strong Treasury committee, with Lord Inchcape as chairman, to consider the increased cost of the production of the metal and to stimulate its output. An early report is expected. The producers are said to be desirous of arranging for the purchase by the government of their output over a period of years at a price liberal enough to encourage a maximum production.

The Twenty-Seventh in Action

"The Yanks are dinkum fighters," or "The Yanks are bonza," is the testimony of the Australian "diggers" or "Aussies" as to the way our men give account of themselves. So a London friend informs us. The mining regiment is doing its part in pushing the Hun back where he belongs, if, indeed, there is such a place. A letter has just arrived from Lieut.-Col. O. B. Perry, in which he says:

Our men have participated in the three offensives with which the Americans have had mostly to do and have gained a lot of experience at the expense of a very few casualties. Just now our first three companies are busily engaged in helping lick the Germans, and we haven't much time to visit around. The boys take a whirl at anything that comes along.

"As to comforts, etc.," adds Colonel Perry, "there are never enough chocolates and cigarettes, and cigars are hopeless."

There's a reason for the Comfort Fund, which, incidentally, is not going to go out of business because of Berlin's latest camouflage about peace. Silently through the Fund a real good has been effected and whether this will continue is up to our friends to decide. Large or small, all contributions help and will be promptly acknowledged in these columns. Send in yours today.

HOW THE COMFORT FUND STANDS

Previously Acknowledged	$18,492.77
C. M. Eye	10.00
C. A. Burdick	5.00
Mining and Metals Section, National Safety Council	125.00
John Herman	10.00
Lane Pearl	5.00
W. L. Gibson	5.00
C. M. Fenton	10.00
Charles Le Vasseur, monthly	5.00
Total	$18,667.77

Make your checks payable to W. R. Ingalls, treasurer of the Association of the 27th Engineers.

John Hamilton Troutman*

John Hamilton Troutman, announcement of whose death was recently received, was born on March 3, 1856, at Philadelphia, Penn. When he was fifteen years old his father died, and it became necessary for him to go to work in a country store in the anthracite region. While there, he continued his studies, and, four years later, passed an examination, receiving a teacher's certificate, but he decided to remain in business. About this time, he became associated with John Price Wetherill and August and Richard Heckscher in the management of coal properties, and formed close friendships with these gentlemen that lasted for the rest of their lives.

In 1881, when the Lehigh Zinc Co. was organized, Mr. Troutman entered its employ, and, in the course of time, occupied several positions of responsibility, in which he contributed largely to the success of the organization. He continued with the company until it was taken over by the New Jersey Zinc Co. in 1897. Those who remember the uncomfortable first year of the consolidation will always retain grateful memories of Mr. Troutman's kindliness, helpfulness and absolute fairness. He remained in the New York office only for about a year, and then went to Chicago as the general manager of the Mineral Point Zinc Co. While there, he made many new friends, and, among other things, started the manufacture of leaded oxide from the mixed sulphides of the West. In June, 1900, he left Chicago for Denver to take charge of the Empire Zinc Company.

This position proved to be the greatest opportunity of Mr. Troutman's life, and he met it worthily. No one who has not traveled in the West can begin to appreciate the high esteem in which he was held there by every one with whom he came in contact, business associates, miners, mine operators and competitors. He was, always and everywhere, absolutely fair, and there was hardly a mine operator in the West who did not prefer to do business with Troutman. The reputation which his unfailing courtesy and fairness gained for the company is one of its greatest assets.

Of late, Mr. Troutman had felt the severe strain of his many years of hard and continuous work for the company, and was forced to take a less active part than formerly. He died suddenly at Denver on Oct. 2. In his death, the company has lost one of its oldest, most faithful and most valuable employees. One of his oldest associates says: "J. H. Troutman, single-minded always in his devotion to his employers and his associates, was a man of unusual gifts and of dynamic working ability. It was a common saying of ours that his pencil was always sharpened for the most thoroughgoing investigation of any proposition brought to his attention, and that he never failed to state his well-grounded conclusions." But more than the energy, ability and conscientious performance of every duty was the fine character of the man, his kindliness, fairness and consideration for every one with whom he came in contact. Mr. Troutman's death leaves a gap that can never be entirely filled.

*By George C. Stone.

Coast Artillery Officers Needed

The Coast Artillery School at Fort Monroe, Va., has announced that officers are needed for the U. S. Heavy (Coast) Artillery. To encourage the application of educated men who would be fitted to obtain commissions after proper training, a scheme of instruction has been worked out.

In each of the five geographical districts, into which the activities of the service are subdivided, men inducted will be grouped in a fort of that district and there given a six-weeks' course in the school of the soldier and in mathematics preparatory to taking the examination for admission to the Coast Artillery School, there to be trained for commissions. However, the entrance examination may be taken immediately, if so desired, without the preliminary training; or an inducted man may take a two-weeks' preparatory course in military instruction and mathematical review instead of one of six weeks.

Liberty Loan Quota Exceeded

The subscriptions for the Fourth Liberty Loan placed through the Special Mining Committee, of the New York district, amounted to $58,926,350, so that its quota of $40,000,000 was exceeded by nearly $19,000,000. This is a fine record and, as has already been pointed out, does not reflect what the entire mining industry has done to help the loan, as it includes only the New York district, and even here, no doubt, there are individuals and companies who have placed substantial subscriptions outside of this committee.

Following are some of the larger subscriptions received through the Special Committee from October 16 to 19, inclusive:

Chile Copper Co. and subsidiaries	$2,300,000
William A. Clark, for United Verde Copper Co., personal and allied interests	1,850,000
Aluminum Company of America	1,825,000
New Jersey Zinc Co., subsidiaries and employees (additional)	1,393,850
Anaconda Copper Mining Co. (additional)	1,500,000
A. Lewisohn & Sons (additional)	1,030,000
American Smelting and Refining Co. (additional)	1,000,000
W. B. Thompson	1,000,000
American Metal Co. (additional)	1,000,000
Inspiration Consolidated Copper Co. (additional)	1,000,000
J. R. De Lamar (additional)	1,000,000
International Nickel Co. (additional)	750,000
Cerro de Pasco Copper Co. (additional)	500,000
Mohawk Mining Co. (additional)	330,000
Granby Consolidated Mining, Smelting and Power Co.	300,000
Beer, Sondheimer & Co.	250,000
August Heckscher (additional)	250,000
U. S. Smelting, Refining and Mining Co. and subsidiaries (additional)	250,000
Wolverine Copper Mining Co. (additional)	200,000
Homestake Mining Co. (additional)	200,000
Florence Iron Co. (additional)	140,000
Michigan Limestone and Chemical Co.	120,000
Quincy Mining Co.	115,000
Employees, Braden Copper Co.	111,000
D. M. Hyman	100,000
W. D. Thornton	100,000
E. P. Earle (additional)	100,000
Nipissing Mines Co. (additional)	100,000
N. Y. & Honduras Rosario Mining Co. (additional)	100,000
Nichols Copper Co.	100,000
Seneca Mining Corporation	100,000

Foreign Trade in Lead and Zinc

Lead and zinc imports in August, 1918, and the corresponding month of 1917 are reported by the Department of Commerce as follows, in pounds:

	August, 1917	August, 1918
Lead ore, contents	748,462	2,802,856
Bullion and base bullion, contents	13,551,993	12,397,866
Imported from:		
Canada	.....	2,678,977
Mexico	13,795,391	12,398,506
Chile	.....	112,385
Other countries	505,064	10,854
Lead pigs, bars and old	1,262,264	.....
Zinc ore and calamine, contents	12,016,102	3,412,338
Imported from:		
Italy	2,000,000	.....
Canada	1,672,827	1,247,740
Mexico	8,343,275	2,164,598
Zinc blocks or pigs and old	33,990	.....
Zinc dust	135,714	.....

Following are exports of lead and zinc for the same periods of time, also reported by the Department of Commerce, in pounds:

	August, 1917	August, 1918
Lead:		
Pigs, bars, etc., produced from domestic ore	3,810,021	15,194,602
Pigs, bars, etc., produced from foreign ore	178,301	3,141,888
Zinc:		
Pigs, etc., produced from domestic ore	18,322,974	5,565,452
Pigs, etc., produced from foreign ore	1,515,071	2,748,357
Sheets, etc	4,242,651	2,545,289

Heading Off Spanish Influenza

The rapid spread of Spanish influenza and the number of fatalities resulting has caused concern to most of the mining companies in the West, who are already short of labor. The Climax Molybdenum Co., operating a molybdenum property about 14 miles from Leadville, Colo., realized that, sooner or later, the epidemic was bound to strike the camp, so preparations were made to mitigate the evil as much as possible. The company has a small but splendidly equipped hospital, in charge of a Safety First man, but to be prepared for any event the club house at the mill was changed into an emergency hospital of 20 beds. Two trained nurses and a doctor were sent to the property, and with the First Aid man and the camp nurse, they were prepared to battle with the epidemic, which, in a locality 12,000 ft. above the sea, would be apt to result seriously if not handled in the most vigorous way. It was decided that every man on the job should be at once examined by the physician, and, if he showed any signs of cold or indisposition, immediately sent to the hospital. As a result, 25% of the employees of the company have already passed through the hospital, most of them showing the early symptoms of influenza, but their treatment in the hospital has been so thorough that in not one single instance to date has pneumonia or the later symptoms of influenza developed, and the men have been returned to work in good physical condition in an average of between four and five days. Similar action might well be taken by other companies.

Domestic Manganese Development

Need for opening new supplies of domestic manganese has passed. An announcement to this effect comes from an official who not only has an important voice in matters pertaining to manganese so far as the Government is concerned, but who has been an ardent champion of the policy of developing domestic resources. His comment on the matter is as follows:

The realization of the vast resources of the United States has, in some respects, been brought about by the stimulation due to war necessities. Previously it was generally agreed that our supplies of manganese ore were trivial, and that we were substantially dependent upon importations. When it becomes necessary to deflect ships from the manganese importing trade in order to use them for direct war purposes, it also became necessary to greatly increase the domestic production; and many of those most familiar with our resources in this connection were pessimistic about the possibility of doing so to the necessary degree. The rapid development of manganese deposits in all parts of the country, however, has been astonishing, and it now appears that, if it was absolutely necessary, we could do entirely without imported manganese. Such a course, however, would require much expense by way of changes in installation; and indications are that it will neither be necessary nor advisable. A considerable amount of ore will evitably be imported, during 1919, from Brazil, coming back on ships which would otherwise return with light cargoes. Sufficient domestic ore is now assured to make up the remainder of the manganese requirements; and, therefore, while it is necessary that the present production should be kept up, there is no longer any apparent need for opening up new supplies. It is a matter for congratulation that the country has shown itself so capable of responding to the threatened manganese shortage for 1918.

Foreign Trade in Copper

Exports of copper from the United States in August, 1918, and in the corresponding month of 1917 are reported by the Department of Commerce as follows, in pounds:

	August, 1917	August, 1918
Ore, contents	351,420	107,120
Concentrates, matte, etc., contents	.....	34,000
Unrefined, etc., in bars	.....	50,247
Refined in ingots, bars, etc	95,733,812	45,876,440
Composition metal, copper chief value	8,400	29,477
Old and scrap	29,752	5,531
Pipes and tubes	2,289,320	303,601
Plates and sheets	1,642,529	762,052
Wire, except insulated	1,425,638	1,537,959

The weight of ore exported in August, 1918, was 1371 long tons, and of concentrates, matte and regulus, 149 long tons.

Imports of copper in August, 1917 and 1918, were as follows, in pounds:

	August, 1917	August, 1918
Ore and concentrates, contents	11,814,430	11,211,497
Matte and regulus, etc	1,632,918	7,334,618
Unrefined, in bars, pigs, etc	34,546,504	42,519,271
Refined, in bars, etc	1,395,268	11,708,671
Old, etc., for remanufacture	464,068	168,027
Composition metal, copper chief value	161,376	111,196

Ore imported in August, 1918, weighed 28,145 long tons; concentrates, 20,720; matte and regulus, 7185 long tons.

Today is an opportune time to send a check for the Comfort Fund of the 27th Engineers.

Editorials

Chrome and Manganese Ores

EARLY in this year, when there was so much discussion respecting the proposed bill for a Mines Administration, the alleged purpose of which was to promote the production of certain minerals, among which were chrome and manganese ores, the *Journal* took the position that the high prices prevailing for those minerals was the best possible stimulus, and indeed, the only stimulus that was necessary.

The passage of the bill dragged on slowly, but it was manifest that the delay was leading to no trouble, for the situation in the minerals of scanty supply was steadily becoming easier. Even before the bill was finally passed, the market reports got into the habit of reporting that chrome ore was unsalable. Now the War Industries Board has officially announced that the chrome ore supply in the United States is sufficient, that the situation is well in hand, and there is no necessity for the present of additional investments being made in this country for the production of chrome ore.

A similar official announcement was made contemporaneously with respect to manganese ore by J. E. Spurr, who has been especially in charge of supplying the needs for that ore. "The rapid development of manganese in all parts of the country," says Mr. Spurr, "has been astonishing and it now appears that if it were absolutely necessary we could get along entirely without imported manganese."

We refrain from any further comments, save to remark that it is gratifying that the hysterical stage has been passed, and also that the law of supply and demand proved to be a safe reliance, as experienced advisers said it would.

Need for Educational Efforts

THE suggestion by C. T. R. that the copper and lead operators conduct a campaign of war education for the benefit of their laborers, is well worth serious consideration.

It is too true that many working men see in the present labor conditions only the opportunity of securing, we will not say earning, the highest wages that they have ever known, and relying on their occupation for exemption, realize to only a small extent the importance of their work in the winning of the war.

In our military training camps lectures are being given explaining fully why it is that we are at war, and the objects that we hope to attain. The young men at our colleges in the Students' Army Training Corps are receiving daily instruction in war aims. If it is advisable to elucidate to the men who are about to go to the front, to the men who are already in close contact with the realities of the war, the reasons for their going, how much more necessary is it to enlighten those who scarcely come in contact with the fighters. It is variously estimated that in the wars of today three to five men are required behind the lines for every man at the front. Whatever may be the number, it includes an army of workers larger than that across the seas, it includes every miner, millman and smelter, educated or ignorant, and all should be given an opportunity to hear and have impressed upon them the importance of the work they are doing, the intimate connection that exists between them and the men at the front, the independence that the fighter must place upon the worker and the utter futility of sending men across without unstinted support from the rear.

These lessons should deal with the practical side by showing the vast amount of raw and manufactured material an army consumes, thus leading up to the patriotism of work; they should deal with the business of loaning to the Government, even in small amounts, thus leading up to the patriotism of buying Liberty Bonds.

They should compare the work and dangers of the men at the front with the work and safety of those behind. And, for those whom we would particularly reach, this may all be done far better through speakers than any amount of printed propaganda.

Advice to Wage-Earners

IN ANOTHER column appears a letter from "A Miner," which we should like to answer as he requests, but we fear for the success of any Sunday School lecture that we might write. Some one, however, should remind the boys, and remind them frequently, that the days of high wages are not with us for all future time. Carpenters, mechanics, miners, and all other laborers are getting high wages, owing to abnormal conditions, and an excessive demand for materials, a demand that permits no delay regardless of cost, because of conditions created by the war.

We do not know whether the existing industrial conditions will disappear gradually or suddenly, but that they will disappear there can be no possible doubt, and with the change of conditions will come less demand for labor, and lower wages, gradually or suddenly, as the case may be.

During the period of the war, non-essential industries have been curtailed, and the destruction of property and the loss of metals have been enormous. Some say there will come a period of restoration, when again there will be work for every laborer and a market for all he can produce, but that day will not be immediately upon the declaration of peace. It will succeed a period of readjustment, a period when there will be many mouths to feed and perhaps but little work to be done right away.

The lean year is coming, boys, just as sure as the end of the war is coming, and the man with a family who has not put some of his surplus away is going to be hard hit, regardless of his willingness to work. If there was ever a time for a man to be frugal it is today, when

a little care will enable him to put away nearly as much as his entire wages in ordinary times.

And when we say put it away we mean put it where it will be safe and ready for the rainy day of which we write. "A safe place?" you ask, "where is a safe place?" We do not pretend to know the merits of all bonds and stocks, of houses and lots, but we do know that in times like the present Uncle Sam's bonds are the safest possible place for loose funds.

A few years ago we used to speak of gilt-edged securities. Some of that gilt faded to silver, and now it looks like copper. What it may look like a year hence we don't know, but we do know that among securities Uncle Sam's notes will stand in a high position. If in the period of depression some bonds fail to pay their interest coupons, Liberty Bonds will not be in that class.

Aside from safety there is another and a more important reason why your savings should go into Liberty Bonds. The safety of the world, the safety of the United States, the safety of your own rights, requires the use of vast sums of money. You have a small portion of that money, and Uncle Sam needs it for a while far more than your daughter needs a piano. He needs it more than you need a new overcoat. In loaning it to him you are making life just that much easier for yourself and family in the days not far ahead. Buy Liberty Bonds, not only when a drive is on, but whenever you can save fifty or a hundred dollars.

Economic Warfare

SERIOUS thinkers in Germany have realized since the beginning of the war that economic considerations would, sooner or later, dominate the whole situation. This realization became a conviction soon after Great Britain's entry into the conflict. The full meaning of Allied naval supremacy was appreciated. High German military authorities realized that their country could be provided only for a limited time with an adequate supply of the indispensable materials for carrying on the war. With the advice of the heads of leading German industrial enterprises, there was organized a department for the securing and controlling of raw material supplies. An inventory was made of all the available supplies of iron ore, copper, tungsten, nickel, and other war minerals and metals.

In preparing for the war years beforehand, the German authorities certainly paid attention to economic as well as military considerations, but it is evident that they miscalculated not only the duration of the war but the amount of military material that would be needed in modern fighting. This is illustrated by the fact that the Germans experienced a serious munition shortage in the early part of 1915. During 1916 the German government was severely criticised by some of its prominent commercial leaders for its want of foresight in economic matters and the inadequancy of its preparation. The government's explanation was that preparation had been made, but on the assumption that the war would last not over a year. The important point here is that a shortage of raw materials actually existed and was admitted. One prominent industrial leader described the situation by saying that the country was in a state of siege, and he expressed fears of the danger of the throttling of Germany by economic pressure. The economic life of Germany is built on a foundation of imported raw materials. The natural advantages and resources of the country are limited. Her most important raw materials are coal, iron and potash. The industry and technical ability of her people in working up raw materials into manufactured articles is responsible for her prosperity.

Of the total German imports during the year prior to the war, nearly 60% consisted of industrial raw materials. Many of these materials are vital to the upkeep of her military establishment as well as to the maintenance of her civilian population in peace time. Germany is dependent on foreign countries for fabrics, cotton, wool, silk, flax, hemp and jute, and to a large measure for leather, furs, and rubber; but more important than all these for the metals copper, tin, platinum, aluminum, nickel, manganese and tungsten. The wholesale requisitioning of church bells, bronze statues, and public and domestic metallic ornaments of all kinds shows how important are the metals, and how serious is the situation regarding them.

The theory that Central Europe could made good Germany's deficiency in raw materials has proved to be an extravagant dream. An investigation of the imports into Germany from Austria-Hungary, Rumania, Bulgaria, Serbia, Greece, and Turkey, during a period prior to the war, indicates that in the case of many important commodities imports amounted to a fraction of a per cent. of the total imports of the same commodities. For example, the import of iron ore from Central Europe into Germany during this period amounted to less than 1% of the total imports of iron ore.

It is interesting to speculate on conditions in Germany after the war, and how she will secure the raw materials which she needs for the resumption of her commercial and industrial life on a normal basis. There can be no real reconstruction without a sufficiency of essential supplies. One of the problems of demobilization will be to get the population back to productive work. Without raw materials there can be no industrial employment. Demobilization without employment means trouble. The Allies, by their command of essential supplies, will control the demobilization of the German army and the process of German recuperation.

Germany has declared that she entered the war to safeguard her economic future, but perhaps she has irretrievably compromised it. She desired a position of economic independence, but she will probably be placed in the humiliating position of dependence on a world she has antagonized. Her agents are already trying to buy up supplies for shipment after the war, but opinion is turned against them. It is recognized that even when the initial difficulty of securing raw materials has been overcome, Germany's export trade must suffer from psychological difficulties on which she did not count before the war.

A Permanent Set

THE strongest piece of material, when subjected to a tensile stress, will lengthen uniformly as the load is applied until a certain load has been reached, when the material becomes permanently distended and its capacity to resist becomes greatly lessened. Continued application of the load in larger increments

produces a sudden failure. The war strength of the German army has been given a "permanent set." It has been irretrievably weakened. Only by greater and still greater force can it be permanently broken. The President's notes and the replies thereto indicate as surely as the needle on the recording cylinder of a testing machine, the condition of the German war machine. But, we cannot take the time to discuss the situation, nor can we desist from our task of increasing the force that our American boys and the soldiers and workers of our Allies are piling on. It is a critical time and a time for everyone to add their quota to the load. The fourth Liberty Loan has gone over the top, but this is only one of the many things that remain to be done. United in our determination, we can exert force enough to cause the destruction of the German war machine. Guns, explosives, war materials and soldiers over there depend upon us over here to supply them to our utmost.

BY THE WAY

Many who are acquainted with conditions in Russia will appreciate the following from the *Sun*:

Lenine

I think if God should damn you utterly
And drive you naked from His awful gate,
The very void would shudder back in hate,
To let you pass. The stars would pale and flee,
And hell itself lift up a sickened snout,
From its accursed den, to spew you out.

—*Perley A. Child.*

History will surely couple the names of Lenine and Trotzky with that of Judas Iscariot.

Some persons have a curious belief in the powers of engineers over the laws of nature. One representative citizen was heard to say to another, as they gazed from the deck of the little steamer that traverses Lake Tahoe at the 2000-ft. wall of the Sierras rimming Tahoe on the eastern side: "Wonderful work the engineers are doing; wonderful indeed! Their latest proposal is to construct a steel siphon over the mountains that you see over there and draw the water to the crest and run it down upon the plains of Nevada. There it will irrigate thousands of acres. It is quite simple, just as simple as a hose siphon. All that is necessary is to place an up and down pipe of sufficient size to carry the water." "Isn't it wonderful!" replied his companion.

An interesting sidelight on the discovery of noe of the manganese claims recently opened up in the Cowichan district, Vancouver, is provided by the following: The locator of the claim is Private Tom Service, who fought with an engineers' corps in France and who had a part in the tunneling of Hill 60, which was blown up by means of the greatest mine in history up to that time, a strong German fortress being literally obliterated. Service returned to Canada a short time ago. He sa wmanganese samples from another part of the Cowichan district and exclaimed that he knew where there was more of the same ore and could find it without trouble. He went out, staked and recorded the claim, and has named it "Hill 60." So there now is a "Hill 60" on Vancouver Island which gives promise of supplying quantities of the raw material for the production of munitions necessary to drive the Hun out of the fair lands he has invaded and devastated.

"Well m'son," quothe Captain Dick, "I 'ear that 'ol bloody country is goin' dry. Dam-me don't naw but wot may be good thing too. Good for some any'ow, for I tell'e this 'ere drinkin' bizness is ruination o' moor than one fine lad these days. 'Ow some poor devils do 'ate to let gaw. Not sayin' don't like bit o' toddy self naow an' then, but never 'as I made 'og over un. I remember back foor year h'ago 'ow Jan Trevarthan used to 'it un. H'awful, m'son, h'awful. But dam-me, never touches un naow. An' dost thee naw 'ow it 'appened? Well, I'll tell 'e.

"Jan wuz sent down with me an' h'other boys to pull pumps to h'Algonquin mine. No more bloody h'ore left in tha mine, min' you, but pumps h'as good h'as new. So dam-me, down we gaws an w'en we gets there, 'ol bloody place wuz fixed h'up, nice h'as you please, for h'our comfort. Company h'even 'ad doctor there to see that we didn't get 'urted. Fine fellow too, that there doctor. H'every time ussen come off shif', in we gaws to that h'office, where we 'ad to change h'every bloody stitch we awned 'an put on dry clothin'. For, min' you m'son, it wuz some bloody wet, down in tha bal. Afore we gets 'alf dressed, in comes that there doctor with gert jug o' whiskey, an', if I do say so self, a bit o' she gaws 'andsome when one's wet. But, min' you, m'son, it wuz but a taste 'e give us. Well, one day, Jan 'e figgers as 'ow there mus' be some chance of havin' moor than that there doctor give un, so, dam-me, down 'e brings a gert large jug of 'is h'own an' 'ides 'im in be'ind 'is locker, an' h'each time doctor give 'im a drink from 'is bottle, why, dam-me, Jan'd sneak three or foor drinks from 'is h'own. An' so it go's along till time come for us to win' up that job. Tha las' day—m'son, never shall I forget h'it. As 'ard work as man ever wuz put to an' h'almos' afore we 'ad tha las' of tha pumps h'out, that water wuz roarin' an' rumblin' like tha crater of Vessuveyuss. So h'into that bucket we piled an' h'up shaf' we gaws. Well, m'son, we h'all 'ad h'our bit an' Jan, by way o' celebratin', 'ad 'is share an' moor too an' h'out 'e starts for that pub, afore tha res' wuz dressed. Dam-me, no sooner 'ad 'e started than back 'e come, white h'as a ghost an' tremblin' from 'ead to foot. 'Boys, sez 'e, 'So 'elp me, Go, I'll never take 'nother drink h'as long as I live,' an' down 'e falls on the flure, cryin' like a baby. Believe it or no, m'son, h'out we gaws, an' there wuz the 'ol bloody groun' strewn with snakes. Snakes, min' you. Well, dam-me, we wuz all 'ard put to h'understan' that sort of 'appin' till tha 'oistin' h'engineer tol' us 'ow it wuz. Seems in h'early days, they 'ad put daown bunch o' drill 'oles an' these 'ere snakes 'ad found tha 'oles comfortin' so daown they gaws an' there they wuz, livin' for years. Well, dam-me, when tha water in tha mine started risin' h'out they come, for no bloody h'animal, but 'errin,' can live in water any'ow. Finally we took Jan, cryin' all tha way 'ome, 'e wuz, an' from that day to this, never a drop 'as 'e touched. 'Ere, son, let's 'ave a bit o' that there Peerless. Wot's think on it?"

Personals

Have You Contributed to the Association of the 27th Engineers?

Philip Argall has been examining mining property near Rico, Colo., recently.

Capt. Richard H. Vail, of the Chemical Warfare Service, has arrived in France.

F. R. Weekes has returned to New York from a four weeks' professional trip to California.

G. L. Sheldon of Ely, Nev., is doing some work at the St. Paul mine near Virginia City, Montana.

Frank G. Willis, of Cripple Creek, is making geological investigations in southwestern Missouri.

Maj. M. Robert Guggenheim is in New York on a special mission after a year's absence in France.

Henry D. G. Reynolds has returned from the Irtysh Corporation's properties in the Altai district, Siberia.

A. A. Turner has resigned as consulting engineer for the Goldstone Mining Co., Goldstone, California.

W. C. Schmidt is mining engineer at the Consolidated Arizona Smelting Co.'s Bluebell mine, Mayer, Arizona.

T. W. Cavers, smeltery superintendent for the Tennessee Copper Co., has resigned. Mr. Cavers has been with the company for the last 10 years.

O. McCraney has left the White Caps Mining Co., in Nevada, to become superintendent of the Belmont Shawmut Mining Co., at Shawmut, California.

Prof. Edward E. Bugbee, of the Massachusetts Institute of Technology, has recently returned from a six weeks' professional trip to Colorado and Utah.

E. V. Daveler has resigned as assistant manager of the Alaska Gastineau Mining Co. to become mill superintendent of the Butte & Superior Mining Company.

Chester Gibbs, mining engineer with the Wirona Copper Co., Michigan, has taken a position with the Seneca Mining Co. He is succeeded by **Allen B. Sanger,** of Butte, Montana.

Stuart Croasdale has changed his business address to 730 Symes Bldg., Denver, Colo., where he will continue in practice as consulting engineer in mining, metallurgy and industrial chemistry.

A. R. Whitman, mining geologist, formerly of Cobalt, Ont., has given up consulting practice to take up instruction in war topography at Columbia University in connection with the Students' Army Training Corps.

T. Ernest Godson, mining commissioner for Ontario, and **T. F. Sutherland,** provincial chief inspector of mines are investigating mining conditions in British Columbia with a view of obtaining suggestions for the improvement of the mining laws of Ontario.

Frank L. Smale, manager of the Portland Gold Mining Co.'s mine at Victor, Colo., has resigned and will go to California. **George M. Taylor,** manager of the company's milling department, will move to Victor from Colorado Springs, and will take charge of both mines and mills of the company.

Walter Douglas, president of the Phelps-Dodge Corporation, is on an inspection trip in the Southwest. With his assistant, **A. T. Thomson,** he is visiting the company's properties at Bisbee, Douglas, Tyrone, Morenci, Globe and Nacozari: **P. G. Beckett** has been granted a leave of absence to enter the military service.

Henry Krumb, consulting engineer of Salt Lake City, has been in Washington for several months, having been appointed a member of the Priorities Committee of the War Industries Board. Mr. Krumb will handle all applications for priority certificates relating to the equipment and supplies for copper and other nonferrous mines and smelteries as well as for various other supplies.

C. B. Lakenan, general manager of the Nevada Consolidated Copper Co., is leaving to take charge of the Chile Copper Co. and will be succeeded by **H. A. Guess,** managing director of the American Smelting and Refining Co.'s mining department. **C. V. Jenkins,** business manager of the Nevada company, has been transferred to the New York office. **C. Zeigler,** private secretary to Mr. Lakenan will fill his position.

Obituary

Lieut. Albert Leslie Stephens, mining engineer and a graduate of the Massachusetts Institute of Technology, 1906, died recently of pneumonia at Camp Humphreys, Virginia. He spent several years in Mexico, but latterly had entered business in New York.

William A. B. Walling, a metallurgist with the Minerals Separation North American Corporation, died in New York, on Oct. 20, of pneumonia. He was born in Wandsworth, London, in 1889, and received his technical training in Battersea Polytechnic College of that city. He had been with the company six years, the last three being spent in this country.

Millard Hunsicker, one of the junior partners of the Carnegie Steel Co., died on Oct. 11 at Harrogate, England. He was born in Athens, Penn. For many years he was foreign representative for the Carnegie company, and later of the United States Steel Products Co. Mr. Hunsicker served under Herbert C. Hoover as vice-president of the Belgian Relief Association, during the time that Mr. Hoover was in Belgium.

Edward B. Cook, assistant manager of the blast-furnace department of Pickands, Mather & Co., Cleveland, Ohio, died on Oct. 13 of pneumonia, following an attack of Spanish influenza. Mr. Cook was 39 years old and was a graduate of the Massachusetts Institute of Technology. He was formerly manager of the Warwick Iron and Steel Co., of Pottstown, Penn., now operated by the Eastern Steel Company. Mr. Cook was a member of the American Institute of Mining Engineers.

Thomas Kearns, vice-president and general manager of the Silver King Coalition Mines Co., of Park City, Utah, and ex-United States Senator, died at his home in Salt Lake City on Oct. 18, aged 56 years, following a stroke of apoplexy brought on by an automobile accident. Ex-Senator Kearns was born near Woodstock, Ont., and later followed mining in the West, first in the Black Hills and then at Park City, where lucky discoveries made him a fortune. He was an owner of the "Salt Lake Tribune" and a director of the San Pedro, Los Angeles and Salt Lake R. R. In politics, he was a Republican and served as Senator from Utah from 1901 to 1905.

Societies

Geological Society of America will meet in Boston Dec. 28 to 31.

American Institute of Mining Engineers will hold its spring meeting Feb. 17 to 20, 1919, in New York.

American Association for the Advancement of Science will meet in Boston from Dec. 27 to Jan. 2 next.

Chamber of Commerce of the United States intends to hold meetings of all the War Service committees dealing with the War Industries Board in a conference at Atlantic City on Nov. 19, 20 and 21.

Society of Chemical Industry, New York section, met at Rumford Hall, New York, on Oct. 25. An address was made on "Gas Warfare, Both Offensive and Defensive," by Maj. H. W. Dudley, of the British-American Anti-Gas Service.

Cleveland Engineering Society has passed an amendment to its constitution providing for joint membership with other societies. Under the joint plan about 40 members have become members of the American Association of Engineers.

South African Institution of Engineers recently announced the awards made for the best papers read last year. J. A. Vaughan received the Institution's gold medal for his paper on the "Factor of Safety in Winding Ropes." T. G. Ottley was awarded the Ingham prize for the best short paper.

Industrial News

John A. Roebling's Sons Co., Trenton, N. J., announces the death of its president, Charles G. Roebling, on October 5.

Lidgerwood Manufacturing Co. has opened its own branch office in the Union National Bank Bldg. at Cleveland, Ohio, for the better handling of its business in contractor's hoists, mine hoists and cableways in that territory. The office will be in charge of Ernest F. Pegg, who has been handling the Lidgerwood line for the W. M. Pattison Supply Co., the company's former agents.

Draeger Oxygen Apparatus Co., Wilkinsburg, Penn., has applied to the Federal Trade Commission for license to use eight patents for respiratory, resuscitating and breathing apparatus, and the trade mark "Pulmotor," which it claims are enemy-owned. The patents were issued originally to Johann Heinrich Draeger, of Lubeck, Germany, and to other assignors to the firm of Draegerwerk Heinrich u. Bernhard Draeger, of Lubeck, Germany. The commission is considering the merits of the application.

Detroit Graphite Co., paint and color makers of Detroit, Mich., is represented in the Southwest by George S. Thomson, with office and warehouse at 104 Leon St., El Paso. Mr. Thomson travels through southern California, Arizona, New Mexico and Mexico and maintains a warehouse stock of paint at El Paso for immediate delivery. The company manufactures a complete line of paint for all purposes, including metal protective coating, "Superior" graphite paint. A new office has been opened in Salt Lake City at 406, 407 Boston Bldg., with P. D. Whatley in charge, who covers Utah, Montana and Colorado.

Trade Catalogs

Cutters. Cleveland Milling Machine Co., Cleveland, Ohio. Price List, Oct. 15, 1918; 3½ x 6; pp. 48.

Tanks. Walter A. Zelnicker Supply Co., St. Louis, Mo. Bulletin No. 252; Oct. 15, 1918; 3½ x 8½; pp. 12. New and second hand tanks of all kinds and sizes.

Roof and Iron Paint, Etc. Monarch Paint Co., Cleveland, Ohio. Circulars describing "Hydrocarbonite" a high-grade roof and iron paint; "Sealtite," a plastic roofing and waterproofing compound; also "Sealtite" in liquid form.

Dean Valve Control. Cutler Hammer Manufacturing Co., Milwaukee, Wis. Pp. 8; illustrated. The pamphlet is entitled "Facts" and describes a valve control consisting of a high torque motor, which opens and closes the valve gate, a limit mechanism automatically disconnecting the motor at the end of the gate travel, and one or more remote control stations from which valve can be operated.

Watt Cars. Watt Mining Car Wheel Co., Barnesville, Ohio. General catalog; 8½ x 11; pp. 156; illustrated. This is a handsomely printed book and the most complete catalog yet published on wood and steel mine cars, ore cars, quarry, contractors' and industrial cars, skips, ore buckets, couplings, car wheels, axles and trucks. It is divided into five parts, as follows: Mining cars, Catalog A; industrial cars, K, ore cars, M; wheels, S; and couplings, W. Copy free on request.

New Patents

United States patent specifications listed below may be obtained from "The Engineering and Mining Journal" at 25c. each. British patents are supplied at 40c. each.

Alloy. Containing Ni, Zr, Al and Si. Hugh S. Cooper, Cleveland, Ohio, assignor to the General Alloys Co., Cleveland, Ohio. (U. S. No. 1,278,304; Sept. 10, 1918.

Amalgamator, Mercury. Lewis Martin Kellogg, Los Angeles, Calif. (U. S. No. 1,278,163; Sept. 10, 1918.)

Drill, Percussion, John R. Abbott, Council Bluffs, Iowa. (U. S. No. 1,278,084; Sept. 10, 1918.)

Ferromolybdenum, Process of Making. Eric Hjalmar Westling and Carl Andersen, San Francisco., Calif.; said Westling assignor of his one-half to Newton W. Stern, San Francisco, Calif. (U. S. No. 1,278,408; Sept. 10, 1918.)

Furnace, Electric. James H. Gray, New York, N. Y. (U. S. No. 1,278,635; Sept. 10, 1918.)

Furnace, Smelting. Elof Karl Hjalmar Lundberg, Bruzaholm, Sweden. (U. S. No. 1,278,696; Sept. 10, 1918.)

Ingot Mold for Casting Manganese Steel. Winfield S. Potter, Pittsburgh, Penn. (U. S. No. 1,278,206; Sept. 10, 1918.)

Manganese Steel, Producing Wrought Shapes of. Winfield S. Potter, Pittsburgh, Penn. (U. S. No. 1,278,207; Sept. 10, 1918.)

Editorial Correspondence

SAN FRANCISCO—Oct. 16

Miners' Wages in Amador County Mother Lode region have again been voluntarily increased by the mine owners. The increase is 25c. and 50c. per day, the lower raise being unconditional and the 50c. raise being paid to men who agree to continue at work not less than 30 days. This makes a maximum day wage of $4.50 for miners and $3.75 and $4 a day for shovelers and carmen. Labor is scarce and not all the mines can be worked full time even at this increase in the wage. The men who have their homes in the several substantial towns on the Lode have no inclination to go to the shipyards or other places of high wages, except in a few cases, but most of the unskilled labor in the mines is of the transient type.

Continued Chromite Production for the first half of 1919 at a rate proportionate to the rate of 1918 production is announced as the present intention of the War Industries Board. The board in a dispatch to Albert Burch of San Francisco advises, if the producers in California and Oregon are unable to find ready market for ore, that he wire the Washington office giving tonnage and guaranteed analysis and price. In giving this information through the press to the chrome producers Mr. Burch adds: "The industry in California and Oregon has been built up at the earnest request of the War Industries Board acting through the Bureau of Mines, but has reached a point where no further extension is desirable. The chairman of the board, however, expressed to me his sense of responsibility on the part of the Government for inducing prospectors, miners and capitalists to engage in the production of chrome ore and his fixed intention to afford those already engaged in the business such reasonable protection for their interests as his department can give."

North Star Mines in the Grass Valley district have yielded but small profit in the last year, owing to war conditions and scarcity of labor. Milling has necessarily been curtailed and now development is ordered stopped. George B. Agnew of New York, president, has advised the stockholders that the company is not justified in paying the usual dividend at this time. During the first six months of 1918 dividends to the amount of $100,000 were paid. Of this sum it seems probable, subject to adjustment at the end of the year, that $30,000 must be considered as having come from the surplus earnings and $70,000 from the reserve for depletion, as a payment in liquidation of capital. Cash resources will enable the mine to be kept in operation and good order although no great profit can be expected. It might be actually profitable to close the mine down, if only the question of profit were considered, but the importance to the Government of the gold production and the dependence of the town of Grass Valley on the mining industry are taken into consideration, so the mines will continue in operation, but with development arrested for the present.

Electric Power Restrictions applied to gold dredges have been rescinded or modified to permit the dredges in the fields where operation had been reduced to half time to now run full 24 hours a day. The loss of time during the period of restriction of the use of electric power was not a great hardship on the dredge owners, because the gold does not get away while it is in the ground, though constant operation is of course more profitable—if it can be said that there is any present profit in gold dredging. The chief hardship fell upon the dredge workmen, who must meet the increased cost of living whether they are employed full or half time. Many of them have their homes and can not afford to go out to seek other employment while waiting for the rains. Indications now are that there will be an abundance of water for the generation of electricity during the season, as the heavy rain in mid September is apparently to be augmented by rain and snow in October. The gold miners, both placer and quartz, in California have less worry over a short rain and snow season than over the heavy costs of operation as applied to essentials other than power.

The Safety Rules for Gold Dredges, issued by the Industrial Accident Commission and effective Jan. 1, 1919, have been completed and are ready for distribution from the office of the commission, at 525 Market street, San Francisco. There are some changes from the tentative rules issued earlier in the year, the minor changes being those that affect general safety and welfare, guards against personal falls and falling objects, and machinery and power transmission. The major changes and additions to the tentative rules affect the electrical department, particularly the rule regarding switches, fuses, automatic circuit breakers, etc., and motors. Provision is made for the appointment, by dredge operators, of persons upon whom notice may be served by the commission through the mine-inspection department. The following named representatives of interests affected by the rules composed the committee which prepared the tentative and the final safety rules: Harold Mestre, consulting engineer, chairman; F. L. Lowell, deputy mine inspector, Industrial Accident Commission, secretary; L. D. Hopfield, department manager Natomas Co. of California; C. W. Gardner, representing Hammon Engineering Co.; A. L. Wilde, district representative International Brotherhood of Steam Shovel and Dredge Men; Carl Brown, manager California Casualty Indemnity Exchange; H. M. Wolfiin, mining engineer, U. S. Bureau of Mines, chief mine inspector, Industrial Accident Commission; R. L. Eltringham, electrical engineer, Industrial Accident Commission.

Pumice Deposits in Eastern Siskiyou County are producing commercial pumice stone which is hauled in motor trucks to Bartle on the McCloud River R. R. The situation of the deposits is 28 miles north of Bartle and 7 miles west of Medicine Lake in a mountainous region between Mt. Glass on the eastern edge of Siskiyou County and Black Crater, 35 miles west. The lava in this region is on the direct northwest trend of the lava flow from the Mt. Lassen and Mt. Shasta regions. Pumice has not been commercially valuable in California until the war conditions have brought about a large demand for all the minerals and metals and kindred substances. The fact that there are numerous lava flows in the state and consequently large amounts of lava ash, pumice and other substances produced by volcanic disturbances seems to have been considered by geologists and other technical investigators of State and Government bureaus as sufficient for the information of the public interested in these materials. The contributions of the State Mining Bureau to these subjects would not induce prospecting and development. It remained for the grub-stake prospector and the small adventurer in development to acquaint the public with the fact that in one of the well-known districts of the state there is a mountain top of material carrying commercial quantities of pumice easily and economically marketable. These deposits are being operated by San Francisco interests who are quarrying the rock and washing it in large tanks in which the tailing settles on the bottom and the pumice floats on the surface. The material is dried and sacked for shipment. Thirteen cars have been loaded at Bartle. The deposits were first prospected and partially developed in 1910 under the direction of J. O. Miller.

SALT LAKE CITY—Oct. 17

Coöperation Between the Bureau of Mines and the State is evidenced by the appointment of Carl A. Allen by the State Industrial Commission to be chief inspector of mines for Utah. Mr. Allen has been in charge of the Bureau of Mines demonstration car in the Butte, Mont., section. He will retain his Government position while serving the State in this new capacity, and will supervise the work of the inspector of metal mines and the State coal mine inspector.

A Mill To Treat Rare Metal Ores has been installed by A. E. Custer here. Plant consists of rolls, jigs, ball mill, concentrating tables, and slimers. A flotation unit is now being added. Ores from Utah and Nevada have been treated. Recently several tons of tungsten ore from the Western Utah Copper Co.'s mine in Deep Creek was run through the plant, and a high-grade concentrate obtained. Though the capacity at present is limited, the plant is of interest in that it offers facilities for improving the grade of various ores of the rarer metals, including ores of tungsten, molybdenum, uranium, vanadium, etc., at the same time furnishing data for possible larger-scale operations.

Utah Apex Mining Co., with mines at Bingham, filed suit in the Federal court on Oct. 9 to restrain the Utah Consolidated Mining Co. from extracting ore from certain sections of property claimed to be owned by the Apex Company. Claims involved are the Leonard No. 2, Edna Lode, Nellie Bly, and Handson Lode. A restraining order and damages amounting to $1,750,000 are asked. The Apex claims that 70,000 tons of lead-silver ore have been removed from the property, and at present the Utah Consolidated is extracting 1500 tons of ore from the property each week. "This is being wilfully, unlawfully, fraudulently, and secretly done, and without the license of the owners," the complaint states. The Utah-Apex mine is the largest single producer of lead in the state.

DENVER—Oct. 17

Alunite in Colorado is attracting considerable attention at this time, especially in view of the favorable developments of the White Horse alunite property in the Marysvale district in Utah. Extensive deposits near Rico, in Dolores County, are the objects of investigation by interests that plan the erection of a plant for the recovery of potash, aluminum, and aluminum salts. Alunite is extensively distributed in Colorado. In addition to the large deposits near Rico, the mineral is found near Platoro, in Conejos County; in the Rosita Hills, and on Knickerbocker Hill, in Custer County; in the San Cristobal quadrangle, in Hinsdale and Mineral counties; at Leadville, in Lake County; at the National Bell mine and in the Red Mountain district, in Ouray County; at Summitville, Jasper, Embargo and other places in Rio Grande County; and near Bonanza, Beidell, and on Tracy Creek, in Saguache County.

Freight Rates to the Cripple Creek district may soon be reduced, if the arguments made by prominent shippers of the camp are considered favorably by the railroad rates committee. Many of the district mines have been forced to cease operations, and others have had their outputs curtailed through increased cost of operation. Several of the large producers fear that they will be forced to close down entirely if something is not done soon to remedy the situation. It is urged that a reduction in coal rates to the Cripple Creek district be put into effect as soon as possible. The seriousness of the situation is apparent when the general agent for the Colorado Springs and Cripple Creek lines requests the railroad freight rates be reduced, on the ground that such reduction is of vital importance to the existence of the Cripple Creek district. Before making a decision in the matter, the railroad rates committee will review data regarding the production of ore and the cost of production before the war and under present conditions.

PHOENIX, ARIZ.—Oct. 15

A Reconnoissance Geological Map of Arizona is to be prepared by the State University, involving compilation of all existing records on the subject and the collection of field data where sufficient data are not available or existent. Thereafter, bulletins are to be issued covering the geology and mineral resources of each county. The work is to be in charge of Olaf P. Jenkins, recently appointed geologist of the Arizona Bureau of Mines and connected with the University of Arizona.

"The Association of the Arizona Mining Men" is a new organization perfected in Phoenix which has 50 charter members, but expects to have at least 300 members within a month. It has no connection with the Arizona chapter of the American Mining Congress, and does not include representatives of any of the great producing mines of the state as its membership

is composed principally of men connected with the properties under development or in the shipping stage. Officers are: President, C. P. Reiniger, Tucson; vice presidents, C. S. VanDyke, Miami, and Ed. Bush, Tucson; secretary, W. H. Lawhon, Phoenix; treasurer, W. S. Humbert, Phoenix. Matters under consideration at the first meeting included a discussion of the plan of closing down development mines and even commandeering their equipment. Resolutions on this subject were to the effect that encouragement, not suppression, should be asked for the mines under development within Arizona. Modification was asked of the Treasury Department of the income-tax regulations covering mine profits. Strong support was pledged to a workmen's compensation bill which is to be voted upon at the election in November.

CALUMET, MICH.—Oct. 16

Copper County Mine Managers do not believe that the after-the-war problem of the copper producing corporations will be so much the finding of a market for their product as limiting the market and are taking into consideration the fact that with the end of the war the call for copper for manufacturing munitions will cease entirely, probably forever, excepting in limited amounts, but they point to the great era of reconstruction that will, they believe, bring to the industry the greatest prosperity that it has ever known. One of the problems to be met will be that of price. With Government restrictions removed and the output limited because of high material cost, shortage of labor that is certain to exist for some time or through the reconstruction period, it is believed metal will go "sky-high" unless the producers get together on a price limit. No great reduction in cost of manufacturing the metal is looked for and higher prices for copper than those ruling at present will be welcomed, of course, but the mining corporations do not favor the sky-rocketting of prices that they believe is almost certain to come unless a limit is set. It is anticipated here that the heads of the larger companies will get together on price limiting shortly after war matters have been adjusted and that the price of the metal will be the big subject of conversation and probably of corporate legislation. Of course there is no certain indication that the Government restriction of price is to be lightened. Many of the companies are now preparing for the after-the-war period when they can increase their output practically to capacity but they do not look for any great influx of labor from the old world, anticipating that most of the European governments will limit emigration in order to keep labor at home.

CLEVELAND, OHIO—Oct. 15

Ore Movement in the Vicinity of Duluth is being seriously interfered with by the forest fires, according to "Iron Age" Traffic was delayed on the ore-carrying railroads, and boats were compelled to wait for cargoes. Acting on the suggestion of the operating heads of railroads in the Lake Superior mining district, a committee representing the mining companies is working out a plan to cut off ore shipments from some of the mines about Nov. 1. The purpose of this move is to relieve the railroad situation during the early winter months. In case of small underground mines, it takes some time to accumulate enough ore for a boat cargo. When the weather becomes cold, some of the ore is likely to freeze in the cars before a cargo is accumulated, and thus cause delay in handling. Ore to replace that from mines from which shipments are suspended will in some instances be procured from other properties. In case the ore is of a grade that the consumer must have, and if it cannot be replaced from other mines, a plan is being considered to accumulate a stock pile at the mine and load this on cars with a steam shovel as soon as sufficient ore has been mined for a cargo.

VICTORIA, B. C.—Oct. 16.

Bog Iron From British Columbia will be in use soon for fluxing purposes at the furnaces of Irondale, Wash., arrangements having been made with the owners of the iron property by the Pacific Coast Steel Co. The same company is using magnetite ores from Texada Island, B. C., and the product of its plant is to be utilized in connection with the building of ships in the Puget Sound district. The contract for the bog iron calls for the delivery of 5000 tons as soon as possible, and a spur line is being run from the Pacific Great Eastern Ry. to the property, which is situated near Mons, B. C., in order to provide satisfactory transportation facilities.

The Mining News

ALASKA

ALASKA SHIPMENTS of domestic copper ore and matte to the United States during September were 7371 gross tons, having a copper content of 4,216,816 lb. and valued at $1,106,512.

ARIZONA

Cochise County

COPPER QUEEN (Bisbee)—Construction on new concentrating mill near Warren stopped for the period of the war, owing to inability to secure needed material and machinery.

DENN-ARIZONA (Bisbee)—Sinking to new level at 1800 feet.

PHELPS DODGE CORPORATION (Bisbee)—Has endorsed and authorizes the announcement of a practical mining course to be given to employees of the Copper Queen branch. Men successfully completing this course will be given preference in the selection of future shift bosses.

Coconino County

NAVAJO COPPER (Flagstaff)—Work, abandoned due to high freight cost, to be resumed soon. Order has been given for 100-ton leaching plant. E. J. DeSable of New York is principal owner and T. A. McCullough of Denver will be manager.

Gila County

OLD DOMINION (Globe)—Output of copper during September was 2,292,000 pounds.

INSPIRATION CONSOLIDATED (Miami)—September production was 7,800,000 lb. of copper. Plant operated 28½ days.

Greenlee County

ARIZONA COPPER (Clifton)—Copper produced in September was 4,330,000 pounds.

SHANNON (Clifton)—Credited with best labor record in Arizona, with only nine changes in past month in payroll of 460. Most of the employees are Mexicans.

PARKS-McKEEGHAN-LUCKIE (Duncan)—Has cut gold ore which occurs with fluorspar. Two cars of fluorspar ready to ship.

Mohave County

TWINS (Cerbat)—Will install new 100-ton mill.

EMERSON (Chloride)—Developing by tunnel along the vein. Now in more than 600 ft., with three raises through the ore from the level. A 25-ton milling plant is in operation.

HACKBERRY (Hackberry)—Camp and mill buildings and other improvements nearing completion.

RICO EXPLORATION (Kingman)—Shaft down 190 ft. Crosscutting will begin on 200 level.

Pinal County

RAY CONSOLIDATED (Ray)—General office building being enlarged to accommodate large hall, mine safety division and executive offices on second floor. Near Hayden mill, the company is securing better water supply by sinking ten more wells in Gila river bottom, to be pumped by new compressor plant.

Santa Cruz County

WORLD'S FAIR (Patagonia)—To install 100-ton tube mill.

Yavapai County

KAY (Agua Fria)—Shaft down 500 ft. Drift 70 ft. to the south. Cut copper vein carrying gold and silver.

COPPER CHIEF (Jerome)—Hayden Development Co. announces stoppage of operations during the war, as soon as the mill has cleaned up the ore on hand, on account of high costs. Plans being made for a new process—acid and cyanide mill.

GADSDEN (Jerome)—West crosscut on 1200 level is 350 ft. from shaft in schist and porphyry, but no ore has been cut.

JEROME-SUPERIOR (Jerome)—Shaft below 600 level. At 750 ft., crosscutting will be started westward toward an andesite dyke. Property is one of the most northerly of the district and lies north of the Hopewell tunnel portal.

UNITED VERDE EXTENSION (Jerome)—Less than 400 ft. of work remains to be done to connect main heading of service tunnel with east heading from Texas shaft.

VERDE SQUAW (Jerome)—Shaft sunk more than 100 ft. At 250 ft., crosscut will be started to cut Boulder ledge.

LITTLE EGYPT (Mayer)—machinery being unloaded at mine. Al Blumenauer is manager.

BIG BUG (Prescott)—Ready to install hoist.

SENATOR (Prescott)—Several leases shipping high-grade ore to Humboldt.

TILLIE STARBUCK (Prescott)—Tunnel has cut first of two gold-silver veins and second will be reached within a few days. Property is three miles south of Senator and is in charge of A. J. Pickrell, former managing director of the United Verde Extension.

Yuma County

BLACK GIANT (Cunningham Pass)—Shaft sunk 195 ft. with station cut on the 75 level and one at the 115.

CUPRITE INVESTMENT (Cunningham Pass)—Active development to begin as soon as machinery can be secured.

VICTOR AND BELLE CROWN (Cunningham Pass)—Driving tunnel 200 ft. below old workings which will intersect the known veins at a depth of 600 ft. Geo. M. White is in charge.

HARQUA HALA (Salome)—Gold producer now owned by Yuma Warrior Co. is preparing to explore for copper ore at greater depth.

BLACK GIANT (Wenden)—Shipping copper ore to El Paso from vein developed to 195 ft. S. B. Serf of Jerome is in charge.

CRITIC (Wenden)—Shipping two carloads a week of gold-copper ore from 450 level. Under lease to Joseph Nolachek.

CALIFORNIA

Amador County

OLD EUREKA (Sutter Creek)—Shaft sunk 250 ft. in last two months. Total depth 2650 ft. New ground will not be developed till shaft is completed to 3150-ft. point. Waste from mine used for surface filling in preparation of ground for storage of timbers and other supplies. T. Walter Beam is manager.

Del Norte County

CHROME SHIPMENTS to be increased by use of four new motor trucks received at Crescent City. The large production in the county is mostly hauled by trucks to Crescent City and Requa for water shipment to Eureka and delivered to the Northwestern Pacific Ry. for shipment to the East.

Eldorado County

CHROME SHIPMENTS of one carload a week from four leases in the Greenwood and Georgetown districts. Ore hauled by motor trucks to Placerville for rail shipment over Southern Pacific.

Humboldt County

CHROME SHIPMENTS from Eureka over Northwestern Pacific Ry. during the week of Oct. 5 amounted to only three cars, from Del Norte County. One car of Horse Mountain ore is ready for shipment from Essex. Manganese shipments are from Fort Baker mines via Carlotta. Fort Seward shipments are tied up by

bridges being out of commission. Bad weather and shortage of labor will reduce shipments and production during the winter.

Lake County

QUICKSILVER SHIPMENTS through Calistoga light during September. Sulphur Bank shipped 57 flasks; Big Chief, 7 flasks.

Mendocino County

MANGANESE DEPOSIT on Cow Mountain being developed by Carl Angle and associates. Five tons of ore from initial development. Ore to be hauled by motor truck to Ukiah for rail shipment.

Plumas County

DISCOVERY OF PLATINUM reported at placer mine on Grizzly Creek by P. R. Kelsey.

San Diego County

AMERICAN LITHIA CHEMICAL (Pala) —Shipping three carloads of lithia ore a week. Shipments by motor trucks to Temecula, Riverside County.

San Luis Obispo County

LUCKY JAKE CHROME (Santa Margarita)—To install another concentrator to meet increased production.

Shasta County

SCOTTISH CHIEF (Keswick)—To install Gibson mill at a cost of $11,000, ready for commission in November.

Siskiyou County

TWENTY HYDRAULIC MINES in Klamath and Salmon districts are getting ready to renew operation, owing to recent rains which have provided sufficient water.

COLORADO

Boulder County

ROOK (Boulder)—Acquired by L. E. Ewing and associates who will sink shaft an additional 100 feet.

CARIBOU (Caribou)—Yates & Yates have opened vein of payable ore on the 1040 level.

HURON GOLD ORES (Eldora)—Recent development opened payable ore in lower tunnel. Mill in operation. C. I. DuPont is president and G. M. Woodring is superintendent.

MELVINA (Jamestown)—Cleaning out 390 level preparatory to drifting to prospect Little Melvina vein, northeast of present workings.

WANO MINING MILLING (Jamestown) —Mill treating 25 tons of fluorspar daily. Three additional concentrating tables will be installed soon to increase capacity. Company's gold mine shut down because labor cannot be secured to carry on development work. D. S. Gerow is general manager, and James Warren is superintendent.

CRUCIBLE STEEL (Lakewood)—Under development by Thomas Mitchell and T. W. Tinsley. Shaft has been sunk 80 ft. and drifting is in progress.

GOLD COIN (Ward)—To be taken over by new company known as the Ward Gold Coin Mining Co., of which J. F. Weber is manager. Will develop the Gold Coin and Cardiff veins.

UTICA MINING (Ward)—Developing with encouraging results. C. H. Fry is superintendent.

Clear Creek County

GOLD ANCHOR (Alice)—Taken over by the K. & K. Co., of which Guy Harper is manager. A new hoisting engine is being installed, and considerable milling ore has been opened. Milling plant has been overhauled and placed in good running order; table concentration has been discontinued, and flotation equipment has been installed. Smelting ore will be sorted out and shipped to the Argo plant, at Idaho Springs.

KANSAS EXPLORATION (Idaho Springs) —Special meeting of the stockholders to be held at Idaho Springs on Oct. 30 to consider the propriety of dissolving the corporation.

PRINCE ALBERT (Lawson)—Being developed by the Matrix Leasing Co. Payable ore has been opened, and a five-ton test lot has been shipped to the sampler.

TERRIBLE (Silver Plume)—Silver-lead property being reopened and developed by the Denbigh Silver Lead Mines Co. On the 11 level, 273 ft. below the collar of the shaft, at a point 715 ft. east of the shaft, a three-compartment raise has been started on the Terrible vein to connect with the seventh and intervening levels. Between this raise and the shaft the vein has been opened for 250 ft. in payable ore. This level has been equipped with an electrically driven exhaust fan and a line of five-inch ventilating pipe running to the raise. On the 14 level, at a point 715 ft. east of the shaft, a raise which is being driven to connect with the 11 level has been put up 90 ft. At 77 ft. above the 14 level a blind drift is being driven west to connect with the 13 level, to insure good ventilation. A similar connection will be made with the 12 level. When the new raises are finished, they will complete a new working shaft through to the seventh level, where a double-drum electrically driven hoist will be installed. The new shaft will have three compartments, two skipways and one ladder way. At present all ore produced is being broken in development. After the completion of the new shaft, the company plans to increase the production of the mine to 300 tons per day. At the portal of the seventh level, which is the main opening of the mine, office quarters, store room, and steam-heated change room have been constructed. New ore bins have been built, and grizzlies and ore-sorting tables have been installed. Compressed air is supplied to the mine by two compressors, one driven by water power and the other by electric power.

Gilpin County

FIFTY GOLD MINES (Black Hawk)— Entire property sold recently to Morse Brothers Machinery and Supply Co., of Denver, for $22,500. This property, which was at one time estimated to be worth millions of dollars, includes 50 patented gold-mining claims and an 80-stamp mill at Black Hawk. Among the mines included in the sale are the famous Gregory and Bob Tail properties, which are the first lode claims located in Colorado in 1879. The gross production of these properties in gold, silver, copper and lead is estimated at several millions of dollars. The amount paid for the properties is said to be only a fraction of what the equipment is worth, although the plant has been idle for several years and the machinery has deteriorated. The sale is subject to the approval of William B. Harrison, referee in bankruptcy, at Denver.

San Juan County

SUNNYSIDE (Eureka)—Construction work being pushed on new bunkhouse and boarding house at the mine, so that it may be completed before snow falls. Charles McMillan is superintendent of construction.

GOLD KING EXTENSION (Gladstone) —Mill being overhauled and placed in good condition preparatory to early resumption of operations. W. Z. Kinney is manager.

CONGRESS (Red Mountain)—Leased by King brothers, who will continue development work, which recently opened vein of high-grade copper ore. Property formerly operated by Al Kramer, who shipped 36 cars of payable ore before the expiration of his lease.

SUMMIT (Red Mountain)—Considerable development work to be done by this company during the ensuing year. Raise from the Koehler tunnel to the Carbon Lake workings, a distance of 310 ft., is nearly completed. D. A. Ferguson is superintendent.

SHIPMENTS FROM SILVERTON during September were: Sunnyside, 50 cars; Iowa-Tiger, 13; Pride of the West, 11; Mears-Wilfley, 8; Genesee, 8; Mayflower Leasing Co., 5; Congress, 4; Joe & John, 3; American Queen, 3; Hamlet, Highland Mary, Dives Leasing Co., and King Leasing Co., 2 cars each; S. D. & G. lease, Pactolas, Herman Fanchinlo, Anderson & Holmquist, Arthur Johnson, Henrietta Copper Co., and F. Knowles, one car each; miscellaneous lots, 30 cars; total 150 cars.

San Miguel County

SHIPMENTS FROM TELLURIDE during September were: Tomboy, 38 cars; Smuggler-Union and Black Bear, 39; Cimarron, 2; Lewis, 2; total, 81 cars of concentrate.

Teller County

JERRY JOHNSON (Cripple Creek)— New ore body opened on 950 level and its extent is being determined by winze and raise. Trial shipment indicates that ore is of good milling grade. F. C. Denham is lessee and manager.

BIG TOAD (Victor)—Mill now running at full capacity of 100 tons per day, on low grade ore from the Dante mine.

CRESSON (Victor)—Crosscut from Roosevelt tunnel now directly under the Cresson shaft. Raise will be driven to connect with the bottom of the shaft.

DEADWOOD (Victor)—Rich ore opened in old Williams shaft at 55 ft. below the surface. Being worked by the Deadwood Leasing Co. under lease from United Gold Mines Co. New ore bins are under construction. Initial shipment of ore to be made soon.

MODOC (Victor)—Plans erection of a new ore house, to be equipped with conveyors and washers. The 10-drill compressor at the Modoc incline shaft will be removed and installed at No. 3 shaft, and with the 8-drill compressor now in commission will supply air for 18 machine drills. Retimbering of Last Dollar shaft completed to fifth level. Recent development south of shaft has opened three new veins. Plans to drive crosscut from 1500 level of No. 3 shaft to prospect Combination property.

REX (Victor)—New concentrating plant to be erected on property. Grading completed and masons are laying foundations.

MICHIGAN

Copper District

CALUMET & HECLA (Calumet)—Copper production in September was 10,341,468 lb. Producers were: Ahmeek, 1,866,665 lb.; Allouez, 510,000; C. & H., 4,964,872; Centennial, 157,071; Isle Royale, 1,185,643; La Salle, 124,000; Osceola, 1,153,217; Superior, 120,000 and White Pine, 260,000 pounds.

FEDERAL SYNDICATE (Calumet)— Closed down. Thirteenth mine to shut down in 18 months.

SOUTH KEARSARGE (Calumet)— Closed down south shaft No. 2. Men cannot be secured for both shafts.

QUINCY (Hancock)—Building additions to stamp mill plant at Mason to be used for installation of regrinding and flotation process.

MOHAWK (Mohawk)—Using saw-tooth system of mining successfully.

LAKE MILLING, SMELTING AND REFINING (Point Mills) — Employing women as head feeders and they are successfully doing the work.

MONTANA

Beaverhead County

C. F. MERCER (Polaris)—New cyanide plant for treatment of silver ores nearly completed.

Cascade County

ANACONDA (Great Falls) — Second furnace of ferromanganese plant has been blown in.

CASCADE (Neihart)—Construction of new 500-ton mill progressing. Ores, lead-silver sulphide with barite.

Deerlodge County

ANACONDA (Anaconda)—New stack at Washoe smeltery nearing completion.

Jefferson County

MOUNT WASHINGTON (Wickes)—Old silver producer has been opened up and is making shipments.

Park County

GIST (Contact) — Installing 100-ton concentrating plant on chrome property at Big Timber.

Silver Bow County

SCARCITY OF SKILLED MINERS is still felt in the Butte district, and indications are that the production of copper will be below normal this month and possibly next. Many miners left to seek work elsewhere at the start of the I. W. W. trouble, and though some have returned, it is feared that the majority will remain at places where the I. W. W.'s are not permitted by the Federal authorities to have as much sway as they did here in the matter of intimidating the men.

ANACONDA (Butte)—Production of copper during September was 21,800,000 lb. Company has completed its option for the purchase of the Walker Copper Co. of California. Stock was bought from the Plumas Mining Company.

BUTTE AND SUPERIOR (Butte)—During September mined 32,000 tons of ore, producing 9,500,000 lb. of zinc and 180,000 oz. of silver. Mill recovery was 93 per cent.

NORTH BUTTE (Butte)—Development proceeding at Sarsfield shaft, which has been dewatered.

NEVADA

Clark County

LAS VEGAS & TONOPAH R. R. (Las Vegas)—Proposed discontinuance of service between Las Vegas and Goldfield denied by state railroad commission.

Humboldt County

ROCHESTER MINES (Rochester)— Gloryhole opened in quartz croppings on

Hunter lease ground, Block 4, and large tonnage milling-grade ore can be cheaply mined. Loss of motor parts in transit has delayed starting of milling plant, and crew has been laid off temporarily, as all storage room is filled with broken ore.

Lander County

NEVADA-AUSTIN (Austin)—Frank Margrave appointed receiver following filing of suit to foreclose mortgage on property held by W. C. Pitt. Company has mine at Newpass, and recently completed construction of mill there.

Lincoln County

CHRISTMAS CONSOLIDATED (Goodsprings)—Vanadium ore found on four claims, and shipment made to New York recently. Thorough examination will be made to determine possible production. Property in Yellow Pine district.

Lyon County

UVADA GOLD DREDGING (Dayton)—Operating at Santiago Pool, on Carson River, below Dayton, and making recovery of quicksilver and amalgam. Centrifugal pump used to elevate pulp to riffles. For several years during period of large production from Comstock Lode, seven mills using pan amalgamation process, operated along Carson River above this point.

WESTERN NEVADA (Mason)—Operated by Nevada-Douglas Co. New vein opened at extreme east end of 400 level. Ore is primary copper sulphide in character. Leasing inaugurated, and some carbonate and oxide ore is being mined on surface.

Mineral County

CANDELARIA MINES (Candelaria)—Stated that company has lease on old dumps and stope fillings of Mount Diablo and Argentum mines on a flat royalty basis, with agreement to erect plant to treat the ore. Has also acquired Lucky Hill, Badger and H. G. groups. Lucky Hill has extension of Mount Diablo vein, and rich silver ore is being opened. Ore being shipped to smeltery. Candelaria ores carry silver in form of cerargyrite, and cyanide process will be used in treatment.

MINE OPERATORS OF MINA AND LUNING DISTRICTS will hold a meeting at Reno during October to discuss the advisability of building a copper-smelting plant for those districts.

JUMBO COPPER (Mina)—Large tonnage good-grade copper ore being opened in development work. Property east of Mina.

OLYMPIC MINES (Omco)—Cyanide plant treating 100 tons of gold ore daily. Property 25 miles east of Mina. Fred Siebert is manager.

TUNGSTEN DIKE (Sodaville)—Large tonnage of scheelite ore opened in development work, and 40-ton concentrating plant is now being installed. Property formerly owned by Atkins-Kroll Co.; now owned by Messrs. Noonan, Bean and Beck.

WAGNER (Sodaville)—Opened to a depth of 250 ft. and considerable tungsten ore developed. Property adjoining Tungsten Dike mine. Mill may be built.

Nye County

WHITE CAPS (Manhattan)—No work being done on second and third levels. Shaft being sunk through hard rock, and has reached a depth of 85 ft. below fifth level. Mill is operating steadily.

JEFFERSON CANYON GOLD AND SILVER (Round Mountain)—Operating Kanrohat mine, in Jefferson Canyon. Cyanide process will be added to milling plant.

TONOPAH DISTRICT ore production for the week ended Oct. 5 was 8723 tons, of an estimated gross milling value of $148,291. Producers were: Tonopah Belmont, 2173 tons; Tonopah Mining, 3100; Tonopah Extension, 2044; West End, 983; Jim Butler, 102; Rescue, 119 and Montana, 202 tons.

JIM BUTLER (Tonopah)—Crosscutting from winze on lowest level to Fraction vein which was a good producer on levels above but was cut off by a fault.

TONOPAH DIVIDE (Tonopah)—Power line completed, and mine plant in operation. Breaking of ore to begin at once, and shipments of two to four cars weekly made to Goldfield Consolidated mill. Ore will be trucked to Klondyke station on railroad. Shaft will be sunk another lift of 100 ft. from 370 level.

WEST END CONSOLIDATED (Tonopah)—Milling-grade ore being opened in development work on intermediate level above 500 level in Ohio vein. Development work also under way to explore West End vein above 400 level. Ohio vein now furnishing major portion of ore milled. Milling plant making good recovery.

Storey County

UNION CONSOLIDATED (Virginia City)—Progress being made in shaft repairs—also development.

White Pine County

OPHIR GROUP (Aurora) — Tungsten claims have been taken over by interests represented by O. E. Roodhouse, who is in charge of operations. A 150-ton plant is being erected.

OKLAHOMA

Joplin District

COMMONWEALTH (Picher)—To redevelop, and will sink shafts deeper.

OKO MINING (Picher)—To build 250-ton mill, and will purchase jigs, crushers, compressors, and conveyors. A. Meyerhoff is superintendent.

UTAH

Beaver County

MAJESTIC MINES (Milford)—Water in shaft at 386 ft. point at Old Hickory property. Prospecting will be done at this level until pumping equipment can be installed. Ore carries copper with some silver and gold.

Juab County

TINTIC SHIPMENTS for week ended Oct. 11 totaled 164 cars as compared with 145 cars the week preceding.

APEX STANDARD (Eureka) — New hoist and compressor installed. Old shaft, down 165 ft., being repaired for further sinking.

CHIEF CONSOLIDATED (Eureka) — New shaft down over 250 ft. and good progress being made.

EUREKA-LILLY (Eureka)—Drifting west on 1200 level. Property adjoins the Tintic Standard.

IRON KING (Eureka)—New working shaft down 1050 ft. At 1200 level, crosscutting will be started for Tintic Standard vein.

NORTH BECK (Eureka) — Contract awarded to drive two drifts on 1200 level. Shaft recently sunk to the 1200 level.

ZUMA (Eureka)—Sinking from 500 level. Winze down 200 ft. P. J. Fennell is manager.

TINTIC MILLING (Silver City)—Mining ore under lease from Dragon Consolidated and from old Star ground, now a part of the Empire Mines Co. George H. Dern is manager.

Piute County

GREAT WESTERN (Marysvale)—Winze being sunk from tunnel level has cut copper ore. Property in Billion Canyon. J. H. Stocks, superintendent.

Salt Lake County

CONGESTION OF ORE from Alta, at Wasatch, has been relieved to some extent. The Denver & Rio Grande R. R. has a force of men making improvements on the track. The narrow gage road from the mines to Wasatch is in good condition and shipments are expected to be maintained at normal rate soon. Present season favorable for shipping from Alta and the Cottonwoods.

ALTA CONSOLIDATED (Alta.)—Winze being sunk on Braine fissure in ore.

COLUMBUS-REXALL (Alta.)—Silver-copper ore being taken from new raise near main winze. M. R. Evans is manager.

SELLS (Alta)—New aërial tramway from the ore lines to the railroad nearly complete.

Summit County

PARK CITY SHIPMENTS for the week ended Oct. 11 amounted to 3,220,780 lbs. of crude ore and concentrates.

AMERICAN FLAG (Park City)—Work to be resumed. To sink main shaft 200 ft., present depth 1130 ft. Water level just below 1100.

JUDGE MINING AND SMELTING (Park City)—Crosscut from Anchor tunnel to Daly West shaft has been completed, and prospecting and developing in this section will be undertaken soon by both the Judge and the Daly West.

NEW QUINCY (Park City)—Preparations being made to resume work, which will be done through the Daly West.

ONTARIO SILVER (Park City)—New incline shaft being sunk below 1700 level, and is prospecting some untouched territory. Most of the ore being shipped is coming from the 1600 and 1700 levels.

PARK-UTAH (Park City)—Drifting south from main operating tunnel. Paul Hunt is superintendent.

SILVER KING CONSOLIDATED (Park City)—Overhauling and additions to mill in Thaynes Canyon are completed, except for the placing of two large smokestacks. Capacity has been increased from 125 to 150 tons per day.

THREE KINGS (Park City)—New crosscut being driven to the southeast on 500 level has cut several porphyry dikes. Work being done to reach lower ore bearing limestone beds of the Park City formation. W. R. Elliot is manager.

WISCONSIN

Zinc-Lead District

CONNECTING LINK (Cuba City)—New producer has shipped 1200 tons of blende, galena and pyrite since Aug. 1 and has paid two dividends of 5% on $90,000. Situated five miles northeast of Cuba City on the Henry Dall land. Company has also proved up by churn drill and shaft, the ore range on the Coulthard lease, and contemplates the erection of another mill for this tract. R. A. Fox, Cuba City, is superintendent.

HARVEY LEASE (Cuba City)—Charles Wolfe has struck the "Dall" range by churn drill on the Joe Harvey land, north of the Connecting Link and states that a concentrating mill will be provided.

PAQUETTE (Shullsburg) — Material assembled for erection of 25-ton mill. W. A. Porter, Winona, Minn., is the principal owner. Lawrence Markley is superintendent.

CANADA

Ontario

BONSALL (Gowganda)—Drifting on 100 level.

CASTLE— (Gowganda)—Shaft which is being sunk under option by the Trethewey of Cobalt, is nearing the 300 level.

WALSH CLAIMS (Gowganda) — The Crown Reserve, of Cobalt, has relinquished its option on this property.

COBALT SHIPMENTS during September totaled 2,319,515 lb. of ore. Shipping properties were as follows: Dominion Reduction, 356,400 lb.; Coniagas, 308,151; McKinley-Darragh, 280,288; Buffalo, 264,060; Nipissing, 239,750; Kerr Lake, 173,666; Mining Corporation, 129,573; Right of Way, 77,628; Aliadin, 76,000; Edwards & Wright, 65,974; La Rose, 65,930; Beaver Consolidated, 65,318; O'Brien, 64,010; Peterson Lake 60,000; National 59,215; Pittsburg Lorraine, 33,552 pounds.

OPHIR — (Cobalt) — Contact cut by winze and crosscutting being done to pick up vein encountered 140 ft. above.

DOMINION KIRKLAND (Kirkland Lake) Mineralized quartz vein opened up.

KIRKLAND - PORPHYRY (Kirkland Lake)—Extension has been given to injunction secured by the minority interests of the Orr Gold mines to prevent the sale of property to company

PATRICIA (Boston Creek) — Underground work is being speeded up. Four machines are in operation and lateral work is being done at 100 and 200 levels.

HATTIE (Coulson Township)—Ore zone has widened and is yielding rich samples of free gold and tellurides.

CASTLE OIL (Mosa)—Contracts let for drilling of 13 new wells in addition to one which is being sunk by the company. Two other wells are being drilled in the Shetland field, Lambton County.

INDIA

Burma

BURMA MINES (Namtu)—Erecting mill for concentrating lead, silver and zinc ores, according to "Commerce Reports." Mill being built under supervision of American engineers, and American machinery is used throughout. Mine is situated about six miles from Namtu, with which it is connected by a narrow-gage railway. Ore is brought out of the mine through a tunnel two miles long, and electric locomotives will be used to haul the mine cars to large storage bins at the portal. From these bins the ore will be hauled by rail to the mill bins at Namtu. Mill will have a capacity of at least 700 tons per day, and is laid out so that its daily capacity can be extended to 3000 tons. The Burma Mines, Ltd., controlled by the Burma Corporation, is the largest mining corporation operating in Burma. The resident manager and his assistant are Americans, and 33 other American engineers, superintendents, and mechanics are employed.

The Market Report

SILVER AND STERLING EXCHANGE

Oct.	Sterling Exchange	Silver New York, Cents	Silver London, Pence	Oct.	Sterling Exchange	Silver New York, Cents	Silver London, Pence
17	4.7550	101⅛	49⅜	21	4.7550	101⅛	49⅜
18	4.7550	101⅛	49⅜	22	4.7550	101⅛	49⅜
19	4.7550	101⅛	49⅜	23	4.7550	101⅛	49⅜

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

DAILY PRICES OF METALS IN NEW YORK

Oct.	Copper Electrolytic	Tin Spot.	Lead N. Y.	Lead St. L.	Zinc St. L.
17	*26	†	8.05	7.75	8.30 @8.50
18	*26	†	8.05	7.75	@8⅜
19	*26	†	8.05	7.75	@8⅜
21	*26	†	8.05	7.75	@8⅜
22	*26	†	8.05	7.75	@8⅜
23	*26	†	8.05	7.75	@8⅜

* Price fixed by agreement between American copper producers and the U. S. Government, according to official statement for publication on Friday, September 21, 1917, and July 2, 1918.

† No market.

The above quotations (except as to copper, the price for which has been fixed by agreement between American copper producers and the U. S. Government, wherein there is no free market) are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

The quotations for electrolytic copper are for cakes ingots and wirebars.

We quote electrolytic cathodes at 0.05 to 0.10c below the price of wirebars, cakes and ingots.

Quotations for spelter are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis.

LONDON

Oct.	Copper Standard Spot	Copper Standard 3 M.	Copper Electrolytic	Tin Spot	Tin 3 M.	Lead Spot	Lead 3 M.	Zinc Spot
17	122	122	137	334	334	29½	28½	54
18	122	122	137	334	334	29½	28½	54
19	...	...	...	...	...	...	...	...
21	122	122	137	334	334	29½	28½	54
22	122	122	137	334	334	29½	28½	54
23	122	122	137	334	334	29½	28½	54

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given, reckoning exchange at $4.7515: £29½ = 6.2576c.; £54 = 11.4545c.; £110 = 23.3333c.; £125 = 26.5151c.; £260 = 55.1513c.; £280 = 59.3937c.; £300 = 63.6362c. Variations, £1 = 0.2121205c.

Metal Markets

NEW YORK—Oct. 23, 1918

Copper—Refiners are falling further behind in their production and also in their shipments of what they have produced, owing to shortage of labor. The effects of the influenza have been even more serious than was feared.

Late news from the front are to the effect that the Servians have regained the copper mines at Bor, which the Austrians have been exploiting vigorously.

The influenza, which has now spread all over the United States is creating trouble in all industrial affairs. In the metal industry it is diminishing production.

The meeting between the copper producers and the War Industries Board, scheduled for this week, was called off and the matter of the price for copper after Nov. 1 is being arranged by correspondence. It is planned to continue the price of 26c. until Jan. 1, 1919. Most of the producers have already assented to this and it is expected that all of them will do so.

Copper Sheets—The base price of copper sheets remains at 35½c. per lb. Copper wire is quoted at 29½ to 30c. per lb. f.o.b. mill, carload lots.

Lead—The situation continues to work easier, owing to the effective curtailment of non-essential uses. Also, Governmental demands are not so stringent for some purposes, such as the construction of new sulphuric acid chambers, which are completed or are nearing completion.

The works of the Compañia Fundidora y Afinadora de Monterrey were taken over by the Compañia Minerales y Metales (American Metal Co.) on Sept. 15. This plant produces 2000 tons of lead per month and is the only one in Mexico that comprises a refinery.

Tin—The business in so far as this country is concerned is entirely in the hands of the U. S. Steel Products Co. It is believed that the announcement of the fixed price will be made soon.

The War Trade Board in a new ruling (W. T. B. R. 278) have introduced instructions on the importation of tin in order to give effect to the regulation of the distribution of tin and tin ores, concentrates and derivatives under the Tin Executive recently established in London. All outstanding licenses for the importation of pig tin, tin ore and tin concentrates, and for any chemical extracted therefrom, have been revoked as to ocean shipment from abroad after October 20, 1918. Hereafter no licenses will be issued for the importation of these commodities except to cover shipments consigned to the U. S. Steel Products Company.

To conform with the action taken by the Inter-allied Tin Control, all outstanding licenses for the importation of pig tin, tin, ore and tin concentrates have been revoked, effective Oct. 20. In the future licenses will be issued only to cover shipments consigned to the U. S. Steel Products Co.

Zinc—Following the consummation of large business last week, there was a sharp advance in the price, in which speculative buying, probably for covering shorts, apparently played a considerable part. The market responded sharply to this, owing to the improvement in the technical position, although the accumulation of unsold stocks in the aggregate was about as large at the end of the third quarter as it was at the end of the second. However, the real difficulty in obtaining supplies for prompt shipment led to the natural conjecture that there had been some change in the distribution of the stocks in a way that was favorable to the market.

Following the first advance there was a slight reaction, during which some large business was done, including some buying by galvanizers, and toward the close an easier tone was exhibited, but the appearance of an inquiry for a large block for export was considered likely to have some effect within a day or two.

Throughout the week, spelter for prompt shipment commanded a premium, while contracts for delivery during the first quarter of 1919 were freely offered at 8c.

At the request of the War Industries Board, the zinc smelters conferred with a committee of the Missouri and Oklahoma producers in New York last week in order to arrange a sliding scale for zinc ore. The representatives of the smelters and the miners came to an agreement, whereby each smelter is to take its required quota of ore, making payment therefor according to the stipulated schedule which is based on the price for spelter as quoted by the "Engineering and Mining Journal." A large proportion of the smelters have already assented to this agreement, but the matter has not yet been completed.

Zinc Sheets—Unchanged at $15 per 100 lb. less usual traded discounts and extras as per list of Feb. 4.

Other Metals

Aluminum—Unchanged at 33c. per lb.

Antimony—There was further weakness, but very little business was done. We quote spot at 13@13½c. One important interest expresses the opinion that stocks are now smaller than ever known in the history of the trade. Without going quite so far as that, certainly they have been greatly reduced. Consequently, the weakness in this market is the more surprising.

Bismuth—Metal of the highest purity for pharmaceutical use is quoted at $3.50 per lb. for wholesale lots—500 lb. and over.

Cadmium—This metal is quoted at $1.50 @$2 per pound.

Nickel—Market quotation: Ingot, 40c.; shot, 43c.; electrolytic, 45c. per pound.

Quicksilver—Unchanged at $125@130. San Francisco telegraphed "No quotation; market unsettled." The meeting between the quicksilver producers and the War Industries Board, to be held in Washington, has been postponed to Nov. 20.

Silver and Platinum

Silver—Silver is steady at the fixed price in London, 49⅜. Supplies are going forward in about the usual proportions to England and India. Some small amounts have been purchased account the French Mint. Exports to London for week ending Oct. 19 were 1,033,000 ozs. Exports of bar silver from San Francisco, for Sept. were 8,178,000 ounces.

Diplomats in Peking of the various Allied nations, with the exception of the Japanese representatives, have approved an application recently made by China for an embargo on the export of silver. The Chinese officials are said to be formulating the conditions, which will be forwarded to the foreign banks at Shanghai for their consideration.

Mexican dollars at New York: Oct. 17, 77⅛; Oct. 18, 77⅛; Oct. 19, 77⅛; Oct. 21, 77⅛; Oct. 22, 77⅛; Oct. 23, 77⅛.

Platinum—Unchanged.

Zinc and Lead Ore Markets

Joplin, Mo., Oct. 19.—Blende, per ton, high, $78.70; basis 60% zinc, premium, $75; Class B, $65@60; Prime Western, $51@50; calamine, basis 40% zinc, $40@35. Average selling prices: blende $51.31; calamine, $39.29; all zinc ores, $50.51.

Lead, high, $102.35; basis 80% lead, $100; average selling price, all grades of lead, $97.38 per ton.

Shipments the week: Blende 9756, calamine 704, lead 1265 tons. Value, all ores the week, $651,520.

Recently there has been recorded an advance of $1 per ton, but this week advances of 50c. and $1 per ton caused ore to change from one to another buyer. Prime Western grade was generally held at $50 base, but a desire for some with particularly low-lead content caused the slight advances, and they got the ore. Lead has been gradualy lowering for several weeks.

Platteville, Wis., Oct. 19—Blende, basis 60% zinc, highest price reported $74.45; base price for premium grade, $75; base price for high-lead blende, $52. Lead ore, basis 80% lead, $97.50 per ton. Shipments reported for the week were 2335 tons blende, 40 tons galena, and 474 tons sulphur ore. For the year to date the totals are 103,555 tons blende, 6369 tons galena and 37,344 tons sulphur ore. During the week 1798 tons blende was shipped to separating plants.

Other Ores

Chrome Ore—The market is oversupplied, and the only ore that is readily saleable is that assaying upward of 50% chrome oxide, and less than 2% of silica.

Manganese Ore—Unchanged.

Molybdenum Ore—Very little interest is exhibited.

Pyrites—Prices of domestic pyrites are determined by negotiation between buyer and seller; the price range is between 30@ 35c. per unit.

Tungsten Ore—Prices are unchanged from last week, as also are the general conditions.

Iron Trade Review

PITTSBURGH—Oct. 22

At the Duquesne Steel Works, employing about 5100 men, an average of about 750 men per day have been off duty the last few days, chiefly by reason of Spanish influenza. At the Homestead works about 800 of the 8000 men employed at the steel works proper have been away. The two plants show 15% and 10% respectively of absence, but these are exceptionally high. At many plants the epidemic has had little effect. Steel production on the whole is curtailed but little, and is running approximately as high as in September, when such an excellent record was made.

Distribution of steel under the regulations is not working as well as formerly, and some producers are rather seriously concerned over the outlook. It is predicted that trouble will result from the new ruling that priority can be "reflected" but once, so that a given priority applies to a sub-contractor but not to a sub-sub-contractor, who must be served with a separate priority order, secured afresh. There may be so many of these as to delay matters, while mills have difficulty in making up rolling schedules with so many small orders. The War Industries Board regards the ruling as imperative, in order to conserve steel. The continued denial of steel to consumers whose grade of priority is below that which the mills can reach with the amount of steel they have to distribute is being felt much more seriously than formerly. Efforts being made to save steel in the higher ranges of priority may relieve the situation, but new military requirements of importance are continually cropping out. It seems that the more successful the Allied arms are, the more steel is needed.

The regulations as to consumption of tin plate in packing non-perishable food products have been promulgated, and are not particularly drastic. Regulations are expected permitting the use of limited quantities of tin plate for packing various other goods, and the outlook is that more tin plate will be permitted to be made and used in the next three months than was expected a month ago would be the case. Operations are not to exceed 70%, but may reach that proportion. Steel for the production of butt weld pipe has been cut to the various pipe mills, cutting down their output of butt weld by about 30% in November and December. A part of the steel thus saved wil be used for an increased output of oil country goods, which have a general B-2 priority, lately extended to goods handled through jobbers. Sheet production is at about 55% of capacity, some mills operating much below this and some considerably above. Circumstances prevent an evening up of the front in this matter, and the alternative is being adopted of redistributing some sheet orders so that all mills will be able to work down to about the same degree of priority in taking care of orders.

Pig Iron—In the country as a whole the production of foundry grades of pig iron is being restricted further, in favor of the manufacture of basic iron. Hopes are entertained nevertheless that foundry iron can be furnished for the manufacture of the large quantities of semi-steel shells desired. Representations are being made that methods of manufacture will be explained such as to induce foundrymen to undertake the work. Hitherto they have doubted their ability to carry out orders offered. There is practically no activity in the market, and there are few fresh allocations. We quote the market at Government limits as follows: Bessemer, $35.20; basic, $33; No. 2 foundry, $34; malleable, $34.50; forge, $33, f.o.b. furnace, freight from valleys to Pittsburgh being $1.40 and from six detached furnaces somewhat less.

Steel—There is practically nothing being done in the open market, all available unfinished steel being allocated. We quote: Billets, $47.50; sheet bars and small billets, $51; slabs, $50; rods, $57.

Ferroalloys—The market in both ferromanganese and spiegeleisen is very quiet, with slight signs of weakness. We quote 70% ferromanganese at $250, delivered, with $3.50 for extra units, and 16% spiegeleisen at $75, furnace.

Coke—Production of coke in the Connellsville and Lower Connellsville region has continued to decline slightly, but shipments of raw coal to byproduct plants have increased rather sharply. The byproduct plants are all fairly well supplied with coal, but only with the greatest difficulty in some cases, and there is practically no stocking. The quality of beehive coke is improving slightly, on the whole, but there is still much improvement desired.

MONTHLY AVERAGE PRICES OF METALS

Silver	New York			London		
	1916	1917	1918	1916	1917	1918
Jan.	56.775	75.630	88.702	26.960	36.682	44.356
Feb.	56.755	77.585	85.716	26.975	37.742	42.792
Mar.	57.935	73.861	88.082	27.597	36.410	43.620
April	64.415	73.875	95.346	30.662	36.963	47.215
May	74.269	74.745	99.505	35.477	37.940	48.980
June	65.024	76.971	99.500	31.060	39.065	48.875
July	62.940	79.010	99.625	30.000	40.110	48.813
Aug.	66.083	85.407	100.292	31.498	43.418	49.077
Sept	68.515	100 740	101.125	32.584	50.920	49.500
Oct.	67.855	87.332	.....	32.361	44.324	.....
Nov.	71.604	85.891	.....	34.192	43.584	.....
Dec.	75.765	85.960	.....	36.410	43.052	.....
Year	65.061	81,417	.....	31.315	40.851	.....

New York quotations cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Copper	New York		London			
	Electrolytic		Standard		Electrolytic	
	1917	1918	1917	1918	1917	1918
Jan.	28.673	23.500	131.921	110.000	142.895	125.000
Feb.	31.750	23.500	137.895	110.000	148.100	125.000
Mar.	31.481	23.500	136.750	110.000	151.000	125.000
April	27.935	23.500	133.842	110.000	147.158	125.000
May	28.788	23.500	130.000	110.000	142.000	125.000
June	29.962	23.500	130.000	110.000	142.000	125.000
July	26.620	25.904	128.409	119.913	140.409	134.913
Aug.	25.380	26.000	122.391	122.000	137.000	137.000
Sept.	25.073	26.000	117.500	122.000	135.250	137.000
Oct.	23.500	.....	110.000	.....	125.000	.....
Nov.	23.500	.....	110.000	.....	125.000	.....
Dec.	23.500	.....	110.000	.....	125.000	.....
Year	27.180	.....	124.892	.....	138.401	.....

Tin	New York		London	
	1917	1918	1917	1918
January	44.175	85.500	185.813	293.227
February	51.420	92.000	198.974	311.525
March	54.388	(a)	207.443	318.875
April	55.910	(a)	220.171	329.905
May	63.173	(a)	245.114	364.217
June	62.053	(a)	242.083	331.925
July	62.570	(a)	242.181	360.347
August	62.681	(a)	243.978	380.900
September	61.542	(a)	244.038	343.905
October	61.851	.....	247.467	.....
November	74.740	.....	274.943	.....
December	87.120	.....	298.556	.....
Av. year	61.802	.....	237.563	.....

(a) No average computed.

Lead	New York		St. Louis		London	
	1917	1918	1917	1918	1917	1918
January	7.626	6.782	7.530	6.684	30.500	29.50
February	8.636	6.973	8.595	6.899	30.500	29.50
March	9.199	7.201	9.120	7.091	30.500	29.50
April	9.288	6.772	9.158	6.701	30.500	29.50
May	10.207	6.818	10.202	6.704	30.500	29.50
June	11.171	7.611	11.123	7.511	30.500	29.50
July	10.710	8.033	10.644	7.750	30.500	29.50
August	10.594	8.050	10.518	7.750	30.500	29.50
September	8.680	8.050	8.611	7.750	30.500	29.50
October	6.710	.....	6.650	.....	30.500	.....
November	6.249	.....	6.187	.....	30.500	.....
December	6.375	.....	6.312	.....	30.500	.....
Year	8.787	.....	8.721	.....	30.500	.....

Spelter	New York		St. Louis		London	
	1917	1918	19 7	1918	1917	1918
January	9.619	7.836	9.449	7.661	48.329	54.000
February	10.045	7.814	9.875	7.639	47.000	54.000
March	10.300	7.461	10.130	7.286	47.000	54.000
April	9.459	6.890	9.289	6.715	54.632	54.000
May	9.362	7.314	9.192	7.114	54.000	54.000
June	9.371	8.021	9.201	7.791	54.000	54.000
July	8.643	8.688	8.73	8.338	54.000	54.000
August	8.360	8.985	8.190	8.635	54.000	54.000
September	8.136	9.442	7.966	9.092	54.000	54.000
October	7.983	.....	7.813	.....	54.000	.....
November	7.847	.....	7.672	.....	54.000	.....
December	7.685	.....	7.510	.....	54.000	.....
Year	8.901	.....	8.813	.....	52.413	.....

New York and St. Louis quotations, cents per pound. London, pounds sterling per long ton.

Pig Iron, Pgh.	Bessemer‡		Basic‡		No. 2 Foundry	
	1917	1918	1917	1918	1917	1918
January	$35.95	$37.25	$30.95	$33.95	$30.95	$33.95
February	36.37	37.25	30.95	33.95	30.95	33.95
March	37.37	37.25	33.49	33.95	35.91	33.95
April	42.23	36.15	38.90	32.95	41.06	33.95
May	46.94	36.20	42.84	33.00	43.60	34.00
June	54.22	36.36	50.05	33.16	50.14	34.16
July	57.45	36.60	53.80	33.40	53.95	34.40
August	54.17	36.60	50.37	33.40	53.95	34.40
September	46.40	36.60	42.24	33.40	48.5	34.40
October	37.25	.....	33.95	.....	33.95	.....
November	37.25	.....	33.95	.....	33.95	.....
December	37.25	.....	33.95	.....	33.95	.....
Year	$43.57	.....	$39.62	.....	$40.83	.....

‡ As reported by W. P. Snyder & Co.

STOCK QUOTATIONS

N. Y. EXCH.†	Oct. 22
Alaska Gold M.	3
Alaska Juneau	2
Am.Sm.&Ref.,com.	88
Am. Sm. & Ref., pf.	108
Am. Sm. Sec., pf., A	89
Am. Zinc	15
Am. Zinc, pf.	51
Anaconda	71
Batopilas Min.	1
Bethlehem Steel	71
Butte & Superior	24
Butte Cop. & Zinc	10
Cerro de Pasco	36
Chile Cop.	21
Chino	41
Colo.Fuel & Iron	44
Crucible Steel	56
Crucible Steel, pf.	89
Dome Mines	12
Federal M. & S.	11
Federal M. & S., pf.	39
Great Nor., ore ctf.	33
Greene Cananea	56
Gulf States Steel	72
Homestake	85
Inspiration Con	55
International Nickel	32
Kennecott	38
Lackawanna Steel	76
Mexican Petrol.	155
Miami Copper	28
Nat'l Lead, com.	61
National Lead, pf.	104
Nev. Consol.	20
Ontario Min.	7
Ray Con	24
Republic I.&S.,com.	86
Republic I. & S., pf.	100
Sloss-Sheffield	55
Tennessee C. & C.	17
U. S. Steel, com.	110
U. S. Steel, pf.	112
Utah Copper	90
Va. Iron C. & C.	70

BOSTON CURB*	Oct. 22
Alaska Mines Corp.	‡.12
Boston Ely	.94
Boston & Mont.	.45
Butte & Lon'n Dev.	.12
Calaveras	.50
Chief Con.	3
Contact	‡.15
Corbin	.15
Cortez	.13
Crown Reserve	.18
Crystal Cop.	.45
Eagle & Blue Bell	2
First Nat. Cop.	1
Houghton Copper	.45
Intermountain	.05
Iron Cap	18
Mexican Metals	.33
Mines of America	.90
Mojave Tungsten	.07
Nat. Zinc & Lead	11
Nevada-Douglas	.40
New Baltic	.60
New Cornelia	18
Oneco	.20
Pacific Mines	‡.35
Rex Cons.	.06
Yukon Gold	.85

SAN FRAN.*	Oct. 22
Alta	.03
Andes	.04
Beat & Belcher	.01
Caledonia	.01
Challenge Con.	.03
Confidence	.08
Con. Virginia	.07
Gould & Curry	‡.01
Hale & Norcross	.02
Jacket-Cr. Pt.	.05
Mexican	.12
Occidental	‡.40
Ophir	.08
Overman	.01
Savage	‡.02
Sierra Nevada	.04
Union Con.	.10
Utah Con.	.01
Belmont	2.35
Jim Butler	.48
MacNamara	.20
Midway	.08
Mont.-Tonopah	.07
North Star	.07
Rescue Eula	.08
West End Con.	.08
Atlanta	.03
Booth	.02
Comb. Frac.	‡.02
Florence	.10
Jumbo Extension	.09
Kewanas	.02
Nevada Hills	.02
Nevada Packard	.22
Round Mountain	.15
Silver Pick	.02
White Caps	.11
Big Jim	‡.75
United Eastern	4.00

COLO. SPRINGS*	Oct. 22
Cresson Con.	4.93
Doctor Jack Pot	.03
Elkton Con.	.05
El Paso	.10
Gold Sovereign	‡.02
Golden Cycle	1.69
Granite	.18
Isabella	.06
Mary McKinney	.05
Portland	.95
United Gold M.	.12
Vindicator	.39

BOSTON EXCH.*	Oct. 22
Adventure	‡.60
Ahmeek	.82
Algomah	‡.15
Alloues	‡49
Ariz. Com., ctfs.	15
Arnold	‡.20
Bingham Mines	10
Bonanza	‡.16
Butte-Balaklava	‡.25
Calumet & Ariz.	70
Calumet & Hecla	459
Centennial	‡11
Copper Range	49
Daly West	2
Davis-Daly	5
East Butte	10
Franklin	‡4
Granby	‡79
Hancock	‡6
Hedley	‡12
Helvetia	‡.20
Indiana	‡.60
Isle Royale	.26
Keweenaw	‡.70
Lake	‡5
La Salle	‡3
Mason Valley	‡3
Mass	4
Mayflower	3
Michigan	3
Mohawk	57
New Arcadian	‡1
New Idria	‡13
North Butte	14
North Lake	‡.40
Ojibway	‡.75
Old Dominion	42
Osceola	56
Quincy	72
St. Mary's M. L.	49
Santa Fe	‡.60
Seneca	12
Shannon	3
Shattuck-Ariz.	‡14
So. Lake	1
So. Utah	‡.12
Superior	‡4
Superior & Bost.	3
Trinity	3
Tuolumne	.95
U. S. Smelting	48
U. S. Smelt'g, pf.	‡43
Utah Apex	2
Utah Con.	10
Utah Metal	2
Victoria	‡2
Winona	1
Wolverine	21
Wyandot	‡.50

N. Y. CURB†	Oct. 22
Big Ledge	
Butte & N. Y.	‡.75
Butte Detroit	.05
Caledonia	.48
Calumet & Jerome	
Can. Cop. Corpn.	2
Carlisle	‡2
Cashboy	.03
Con. Aris. Sm.	1
Con. Coppermines	5
Emma Con.	‡.03
Goldfield Con.	‡.21
Goldfield Merger	‡.01
Greenmonster	‡
Hecla Min.	5
Howe Sound	‡4
Jerome Verde	
Louisiana	‡
Magma	‡32
Majestic	.19
Marsh	‡.03
McKinley-Dar-Sa	.40
Milford	‡.75
Mother Lode	.39
Nixon Nevada	.37
Ohio Cop.	
Rawley	‡2
Ray Hercules	4
Richmond	‡.56
Rochester Mines	.33
St. Joseph Lead	‡14
Standard S. L.	
Stewart	.14
Success	.11
Tonopah	‡2
Tonopah Ex.	1
Tribullion	‡
Troy Arizona	.10
United Verde Ext.	.38
United Zinc	‡1
Utica Mines	‡.08

TORONTO*	Oct. 22
Adanac	.08
Bailey	.05
Beaver Con.	.27
Chambers Ferland	.09
Coniagas	3.00
Hargraves	.03
Kerr Lake	6.00
La Rose	.37
Min. Corp. of Can.	2.00
Nipissing	8.25
Peterson Lake	.08
Temiskaming	.28
Wettlaufer-Lor.	.03
Davidson	‡.25
Dome Exten.	.20
Dome Lake	.10
Hollinger	4.75
McIntyre	1.50
Newray	.09
Porcu. Crown	.15
Teck-Hughes	.27
Vipond	‡.14
West Dome	.09

* Bid prices. †Closing prices. ‡ Last quotations.